

From: Whittaker, Laura [laura.whittaker@aptim.com]
Sent: Tuesday, July 24, 2018 9:43 AM
To: Liscio, Matthew P CIV SEA 04, NAVSEA DET RASO [matthew.liscio@navy.mil]
CC: Slack, Matthew L CIV SEA 04 04N [matthew.slack@navy.mil]; Howard, Leslie A CIV NAVFAC SW [leslie.howard@navy.mil]; Noble, Kimberly K CIV SEA 04, NAVSEA DET RASO [kimberly.k.noble1@navy.mil]; Johnson, Nels [Nels.Johnson@aptim.com]; Schul, Raymond [raymond.schul@aptim.com]; Guillory, Jeffrey [jeffrey.guillory@aptim.com]; Meldrum, Amy [amy.meldrum@aptim.com]; Hanelt, Norm [Norm.Hanelt@aptim.com]; Killpack, Randall [randall.killpack@aptim.com]; Gerg, David [david.erg@aptim.com]; Chi, Minhsec [minhsec.chi@aptim.com]; Orman, Sean [sean.orman@aptim.com]; Rogers, Bryon [bryon.rogers@aptim.com]
Subject: [Non-DoD Source] Data package ready for review - HPNS PE-2, RSY D10 (Use 8)
Attachments: HPNS APTIM RSY D10 (Use 8) Soil Non-LLRW Concurrence Request 07242018 (reduced).pdf

Mr. Liscio,

APTIM request RASO concurrence to designate this soil as Non-LLRW soil.

If there are any questions or if additional data is required, please contact me.

Thank you.



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APTIM
Hunters Point Naval Shipyard
200 Fisher Avenue
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Hunters Point Naval Shipyard, Parcel E-2 RSY Data Report

Contract No. EMAC III CTO-0013						
RSY Pad: D10	RSY Pad Use Number: USE 8	First Submittal <input checked="" type="checkbox"/>	Second Submittal <input type="checkbox"/>			
Data attached and submitted by: Laura Whittaker		Data Report Submittal Date: 07/24/2018				

Soil Sample Data						
Sample Identification	Survey Location	Type of Sample	²²⁶ Ra Final Analytical Results (pCi/g)	¹³⁷ Cs Final Analytical Results (pCi/g)	⁶⁰ Co Final Analytical Results (pCi/g)	Total Sr Final Analytical Results (pCi/g)
		Upper limit of site reference background	1.633	0.113	0.252	0.331
PE2-RSYD10-U8-S001	1	Systematic	0.586	-0.0353	0.0423	0.0212
PE2-RSYD10-U8-S002	2	Systematic	0.748	-0.0624	-0.1140	N/A
PE2-RSYD10-U8-S003	3	Systematic	0.182	0.0318	0.0457	N/A
PE2-RSYD10-U8-S004	4	Systematic	0.551	0.0258	-0.0767	N/A
PE2-RSYD10-U8-S005	5	Systematic	0.945	-0.0218	-0.0181	N/A
PE2-RSYD10-U8-S006	6	Systematic	0.868	-0.0305	0.0651	N/A
PE2-RSYD10-U8-S007	7	Systematic	0.719	0.0325	0.00316	N/A
PE2-RSYD10-U8-S008	8	Systematic	0.689	-0.0295	0.0111	N/A
PE2-RSYD10-U8-S009	9	Systematic	0.373	0.00548	-0.022	N/A
PE2-RSYD10-U8-S010	10	Systematic	0.538	0.0491	0.0287	N/A
PE2-RSYD10-U8-S011	11	Systematic	0.674	0.003	-0.0649	-0.0297
PE2-RSYD10-U8-S012	12	Systematic	0.809	0.000	-0.0271	N/A
PE2-RSYD10-U8-S013	13	Systematic	0.918	0.0187	0.0277	N/A
PE2-RSYD10-U8-S014	14	Systematic	0.197	0.0154	0.0242	N/A
PE2-RSYD10-U8-S015	15	Systematic	0.806	-0.0688	-0.0198	N/A
PE2-RSYD10-U8-S016	16	Systematic	0.655	0.00662	-0.0202	N/A
PE2-RSYD10-U8-S017	17	Systematic	0.615	0.00674	0.0405	N/A
PE2-RSYD10-U8-S018	18	Systematic	0.476	0.0229	0.0260	N/A

¹³⁷Cs Cesium-137
⁶⁰Co Cobalt-60
²²⁶Ra Radium-226
Sr Strontium
pCi/g Picocuries per gram

Instrument and Survey Data										
Activity	Survey #	Date	Meter	Calibration Due Date	Serial #	Reference Area Static Bkgd	Reference Area Static 3σ IL	Reference Area Scan Bkgd	Reference Area Scan 3σ IL	Range
RSI Gamma Walkover Survey	HPRS-06132018-PE2-ROV1-2577	06/13/2018	RS-701/RSX-1	N/A	Console: 6006 Detectors: 5597,5678	N/A	N/A	3,224 CPS	4,459 CPS	2,450-4,143 CPS
RSI Follow-up Static Survey	HPRS-06142018-PE2-JSS1-2586	06/14/2018	RS-701/RSX-1	N/A	Console: 6006 Detectors: 5597,5678	3,834 CPS	4,270 CPS	N/A	N/A	3,077-3,825 CPS
Systematic Sample Survey	HPRS-06142018-PE2-JSS-2591	06/14/2018	2221	07/12/2018	271439	15,783 CPM	18,714 CPM	N/A	N/A	11,019-14,975 CPM

3σ IL Investigation Level (established at 3σ above the mean of the Reference Area dataset)

CPS Counts per second

CPM Counts per minute

Summary
1) RSI gamma walkover survey and data review—upon review of initial scan data, follow-up static investigations were deemed necessary, and investigation locations were identified as per the RSI Data Evaluation Process (pages 3-4). Gamma scan coverage is shown on the Systematic Sample Survey map (page 8). Contour maps of scan data are shown on RSI Data Plots (page 5). Data review results are summarized on RSI Review Summary (page 6).
2) RSI Follow-up static survey—23 locations identified during the data review process were investigated, with readings less than the Reference Area static IL at all locations for regions of interest (ROIs) 3, 6, 7, 8, and 9 (VD1). Follow-up locations are shown on the RSI Follow-up Static Survey map (page 7).
3) Eighteen systematic soil samples (001-018) were obtained and submitted for gamma spectroscopy analysis. Sample locations for systematic samples are shown on the Systematic Sample Survey map (page 8). TestAmerica sample results are attached (pages 35-58). Ten percent of the systematic soil samples (two samples in total, PE2-RSYD10-U8-S001 & PE2-RSYD10-U8-S011) were also analyzed for total strontium. Total Strontium results are also included in the TestAmerica sample results report (pages 35-58).
Conclusions: All locations with elevated Z-scores identified by the RSI gamma walkover survey were determined to be consistent with background. 23 locations were investigated during the follow-up static survey, with readings less than the Reference Area static IL at all locations for ROIs 3, 6, 7, 8, and 9 (VD1). Spectral analysis results and gamma static data for each region of interest (ROI) are provided (pages 9-31). Final analytical results for systematic samples from this RSY pad are concluded to be comparable to background. Histograms showing soil sample activity concentrations are provided (pages 32-34). Ten percent of the systematic soil samples (two samples in total, PE2-RSYD10-U8-S001 & PE2-RSYD10-U8-S011) were also analyzed for total strontium, with concentrations less than the Project Action Limit of 0.331 pCi/g, as shown in the Soil Sample Data table (page 1). RSY D10 (Use 8) contains soil from the chemically contaminated (Lead- greater than project action limit) over-excavation areas of Freshwater Wetlands Survey Unit 05 and the Panhandle Survey Unit 17 (FW-05 & PH-17). APTIM request RASO concurrence to release this soil as Non-LLRW. Disposition: This soil shall be dispositioned as non-LLRW waste and to be disposed of off-site at a CERCLA landfill.

RSI Data Evaluation Process

RS-700 Mobile Radiation Monitoring System

- Self-contained gamma-ray radiation detection and monitoring system
- (2) RSX-1 4-liter NaI(Tl) gamma detectors oriented perpendicular to the direction of travel (VD1 denotes both detectors summed; VD3 refers to the left detector; and VD4 refers to the right detector)
- Multi-Channel Analyzer, allowing for monitoring of energy-specific regions of interest (ROIs)
- RadAssist survey software for control, monitoring, and recording

Ten ROIs have been established for radium and progeny, cesium, and cobalt, as well as other naturally-occurring or anthropogenic gamma-emitting radionuclides that may be of interest:

ROI	Description	Energy Range (keV)	Primary Peak (keV)
1	Total counts	411 – 2811	N/A
2	Potassium	1371 – 1569	1460
3	U/Ra-226	1659 – 1860	1764 (Bi-214)
4	Thorium	2409 – 2811	2614 (Tl-208)
5	Annihilation	456 – 570	511
6	Ra-226	546 – 666	609 (Bi-214)
7	Cs-137	600 - 720	662
8	Pb-214/Ra-226	327 – 399	351
9	Co-60	1085 - 1370	1173/1332
10	Gross Counts	24 – 2811	N/A

A tiered approach is used during data review to identify follow-up locations. Raw data are exported to a comma delimited format using RadAssist and imported into an Excel spreadsheet for review and analysis. The following review steps are completed to determine if additional follow-up measurements are necessary:

- **Playback Review:** The data file is replayed in RadAssist and reviewed for elevated count rates in ROIs 6, 7, 9, and 10 for virtual detector (VD) 1 (both detectors summed). The scan screen is also monitored for elevated count rates and alarms.
- **Count Rate Time Series Review:** The count rates for ROIs 6, 7, 9, and 10 for VDs 1, 3 (detector 1), and 4 (detector 2) are plotted in a time series and reviewed for additional peaks in count rate.
- **All ROIs:**
 - **Z-Scores:** The Z-Scores are calculated for each location in all ROIs for VDs 1, 3, and 4. Any location with four or more ROIs having a Z-Score greater than three ($Z>3$) is marked for follow-up.
 - **Local Z-Scores:** Local Z-Scores are calculated using a moving average for each data point in all ROIs for VDs 1, 3, and 4 to identify elevated count rates where the background is variable (e.g. multiple surface types). Any location (in a survey unit that meets this condition) with four or more ROIs having a local $Z>3$ is marked for follow-up.
 - **Semi-local Z-Scores:** Semi-local Z-Scores are calculated using the global average, but with a moving average for the standard deviation for VDs 1, 3, and 4. This is used for survey data that have a consistent background but an area or areas of highly elevated count rates, in order to identify smaller areas of elevated count rates that may not otherwise be identified by the initial Z-score review. Any location (in a survey unit that meets this condition) with four or more ROIs having a semi-local $Z>3$ is marked for follow-up.
- **ROIs 3, 6, 8, and 10 (radium-specific ROIs):**
 - Z-Scores: The Z-Scores are calculated for each location in the radium-specific ROIs for VDs 1, 3, and 4. Any location with three or more radium-specific ROIs having a $Z>3$ is marked for follow-up.
 - Local Z-Scores: Local Z-Scores are calculated using a moving average for each data point in the radium-specific ROIs for VDs 1, 3, and 4 to identify elevated count rates where the background is variable (e.g. multiple surface types). Any location (in a survey unit that meets this condition) with three or more radium-specific ROIs having a local $Z>3$ is marked for follow-up.
 - Semi-local Z-Scores: Semi-local Z-Scores are calculated using the global average, but with a moving average for the standard deviation for VDs 1, 3, and 4. This is used for survey data that have a consistent background but an area or areas of highly elevated count rates, in order to identify smaller areas of elevated count rates that may not otherwise

be identified by the initial Z-score review. Any location (in a survey unit that meets this condition) with three or more radium-specific ROIs having a semi-local $Z > 3$ is marked for follow-up.

- **ROI 7 (cesium-specific ROI):**
 - Z-Scores: Z-Scores are calculated for each location in ROI 7 for VDs 1, 3, and 4. Any location having a $Z > 3$ is marked for follow-up.
 - Local Z-Scores: Local Z-Scores are calculated using a moving average for each data point in ROI 7 for VDs 1, 3, and 4 to identify elevated count rates where the background is variable (e.g. multiple surface types). Any location (in a survey unit that meets this condition) having a local $Z > 3$ is marked for follow-up.
 - Semi-local Z-Scores: Semi-local Z-Scores are calculated using the global average, but with a moving average for the standard deviation in ROI 7 for VDs 1, 3, and 4. This is used for survey data that have a consistent background but an area or areas of highly elevated count rates, in order to identify smaller areas of elevated count rates that may not otherwise be identified by the initial Z-score review. Any location (in a survey unit that meets this condition) having a semi-local $Z > 3$ is marked for follow-up.
- **ROI 9 (cobalt-specific ROI):**
 - Z-Scores: Z-Scores are calculated for each location in ROI 9 for VDs 1, 3, and 4. Any location having a $Z > 3$ is marked for follow-up.
 - Local Z-Scores: Local Z-Scores are calculated using a moving average for each data point in ROI 9 for VDs 1, 3, and 4 to identify elevated count rates where the background is variable (e.g. multiple surface types). Any location (in a survey unit that meets this condition) having a local $Z > 3$ is marked for follow-up.
 - Semi-local Z-Scores: Semi-local Z-Scores are calculated using the global average, but with a moving average for the standard deviation in ROI 9 for VDs 1, 3, and 4. This is used for survey data that have a consistent background but an area or areas of highly elevated count rates, in order to identify smaller areas of elevated count rates that may not otherwise be identified by the initial Z-score review. Any location (in a survey unit that meets this condition) having a semi-local $Z > 3$ is marked for follow-up.
- **Z-Score Time Series Review:** The three types of Z-Scores for ROIs 6, 7, 9, and 10 for VDs 1, 3, and 4 are plotted in a time series and reviewed for additional peaks in Z-Scores.

Any location selected for follow-up or with a Z-Score > 3 in a radium-, cesium-, or cobalt-specific ROI will undergo spectral analysis to determine if it is statistically likely that there are ROC concentrations present at that location in quantities greater than background.

A background spectrum is subtracted from the local spectral data for a given location, and the resulting net spectrum is plotted. Critical levels, as defined in Section 6.7.1 of the Multi Agency Radiation Survey and Site Investigation Manual are calculated and plotted based on background levels. The critical level is the level, in counts, at which there is a statistical probability (with a predetermined confidence) of incorrectly identifying a measurement system background value as greater than background. Any response above this level is considered to be greater than background. The critical level is calculated for ROIs 6, 7, 8, and 9 according to the equation shown below:

Where:

$$L_C = 2.33\sqrt{B}$$

LC	=	critical level (counts)
B	=	average background in the ROI

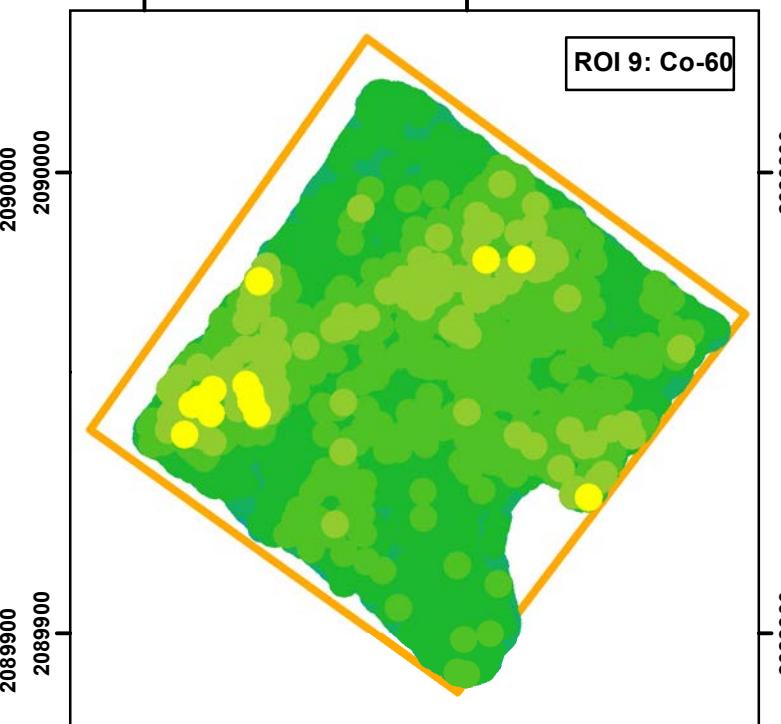
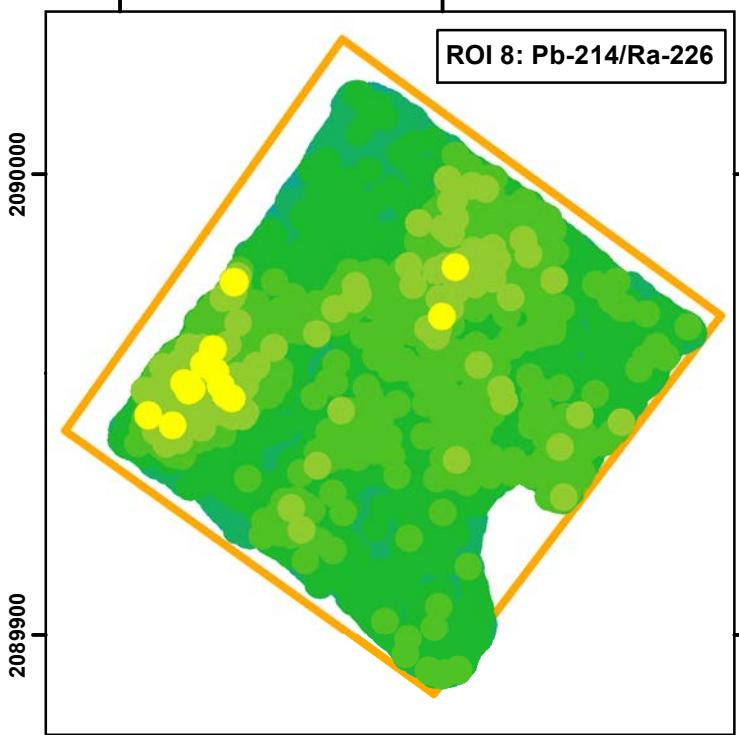
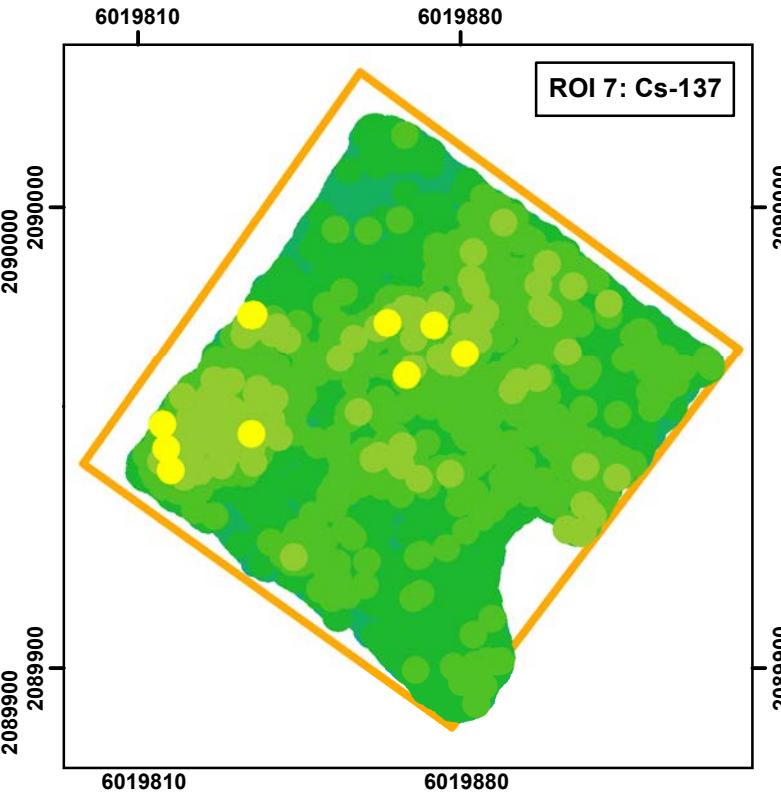
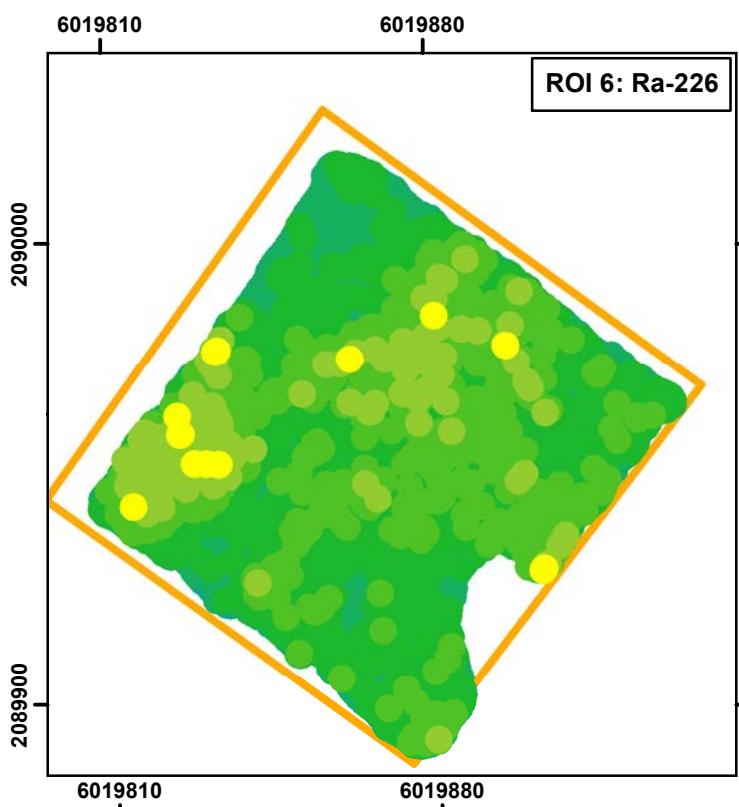
When count rates in the net gamma spectrum at a given location do not exceed critical levels for any radium-, cesium-, or cobalt-specific energy ranges, it is unlikely that ROC concentrations exist at that location above background.

Any data point that is both above the critical level and within the energy range of a given ROI is considered above background for that radionuclide and will be flagged for further investigation in the field.

RSI Data Plots
HPNS Parcel E-2
RSY Pad D10 (Use 8)

Contour Map

Page 5 of 58
 Soil Excavation Site:
 FW-05 & PH-17 Over-excavation



RS-700 Gamma Walkover Survey Data (VD1)

- | | |
|-------------------------------------|--------------------------------|
| Yellow dot: > 3 std dev | Green dot: > -1 to < 0 std dev |
| Light green dot: > 2 to < 3 std dev | Cyan dot: > -2 to < -1 std dev |
| Dark green dot: > 1 to < 2 std dev | Blue dot: > -3 to < -2 std dev |
| Dark green dot: > 0 to < 1 std dev | Dark blue dot: < -3 std dev |
- RSY Pad Boundaries

0 15 30 60
 Feet

Coordinate system: CSP Zone III, NAD83, US Survey Foot



RSI Review Summary

Summary:

23 locations were initially selected for follow-up investigation. Locations were identified by elevated peaks noted in the playback review and/or time series charts, and by using the Z-Score, Local Z-Score, and Semi-Local Z-Score reviews as described in the RSI Data Evaluation Process on pages 3-4. Spectral analyses performed on gamma static data at these locations do not indicate the presence of ^{226}Ra , ^{137}Cs , or ^{60}Co above background. Gamma static readings at these locations are less than the Reference Area static IL for ROIs 3, 6, 7, 8, and 9; figures are provided on pages 9-31.

RSI Follow-up Static Survey
HPRS-06142018-PE2-JSS1-2586

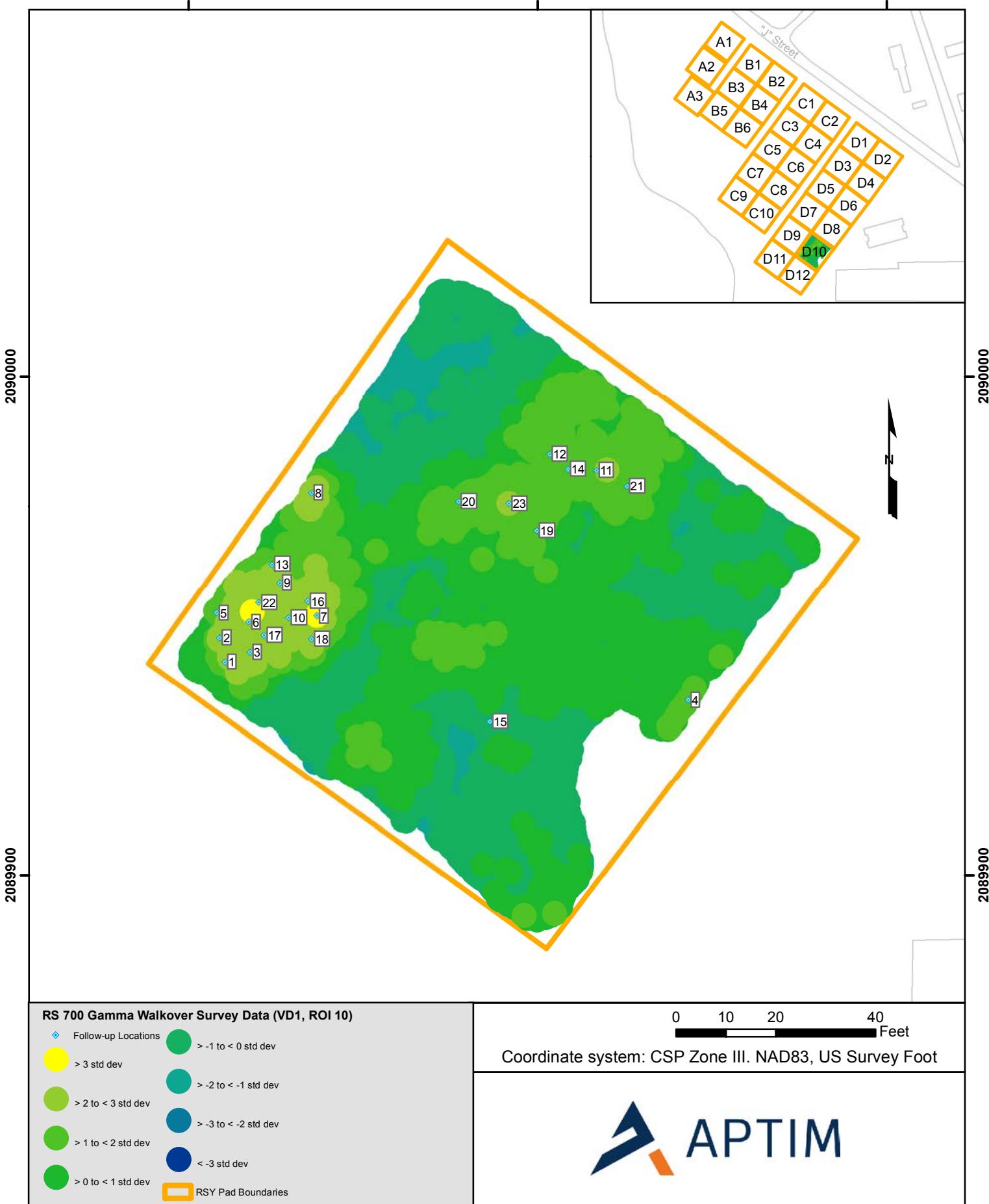
HPNS Parcel E-2 RSY Pad D10 (Use 8)

Soil Excavation Site:
FW-05 & PH-17

6019810

6019880

6019950



Systematic Sample Survey
HPRS-06142018-PE2-JSS-2591

HPNS Parcel E-2 RSY Pad D10 (Use 8)

Soil Excavation Site:
FW-05 & PH-17

6019810

6019880

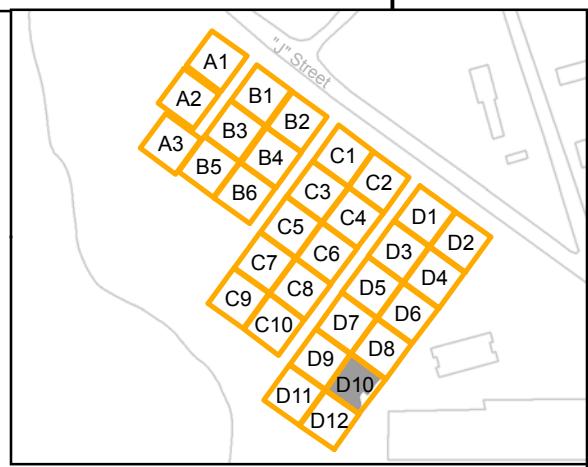
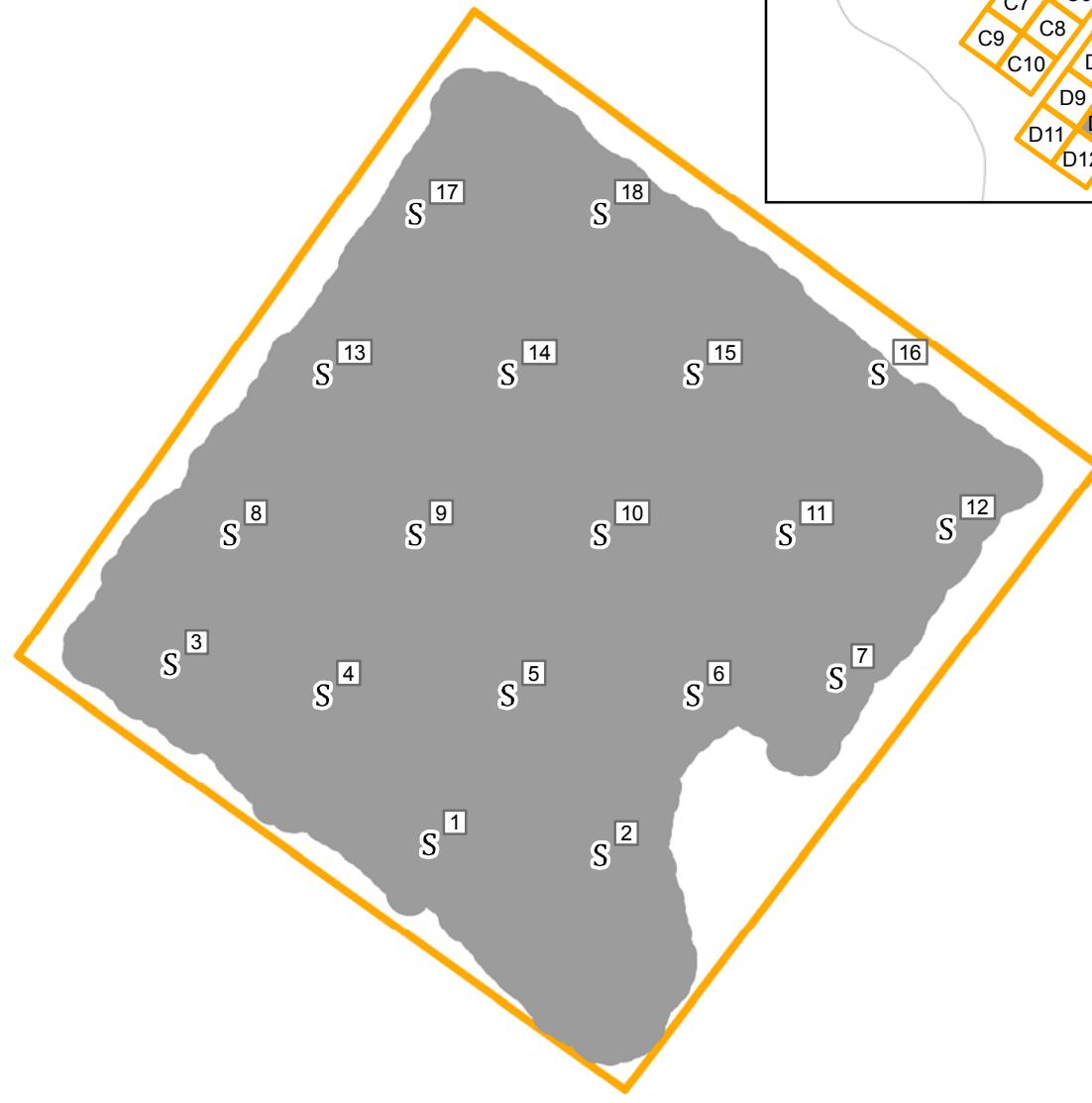
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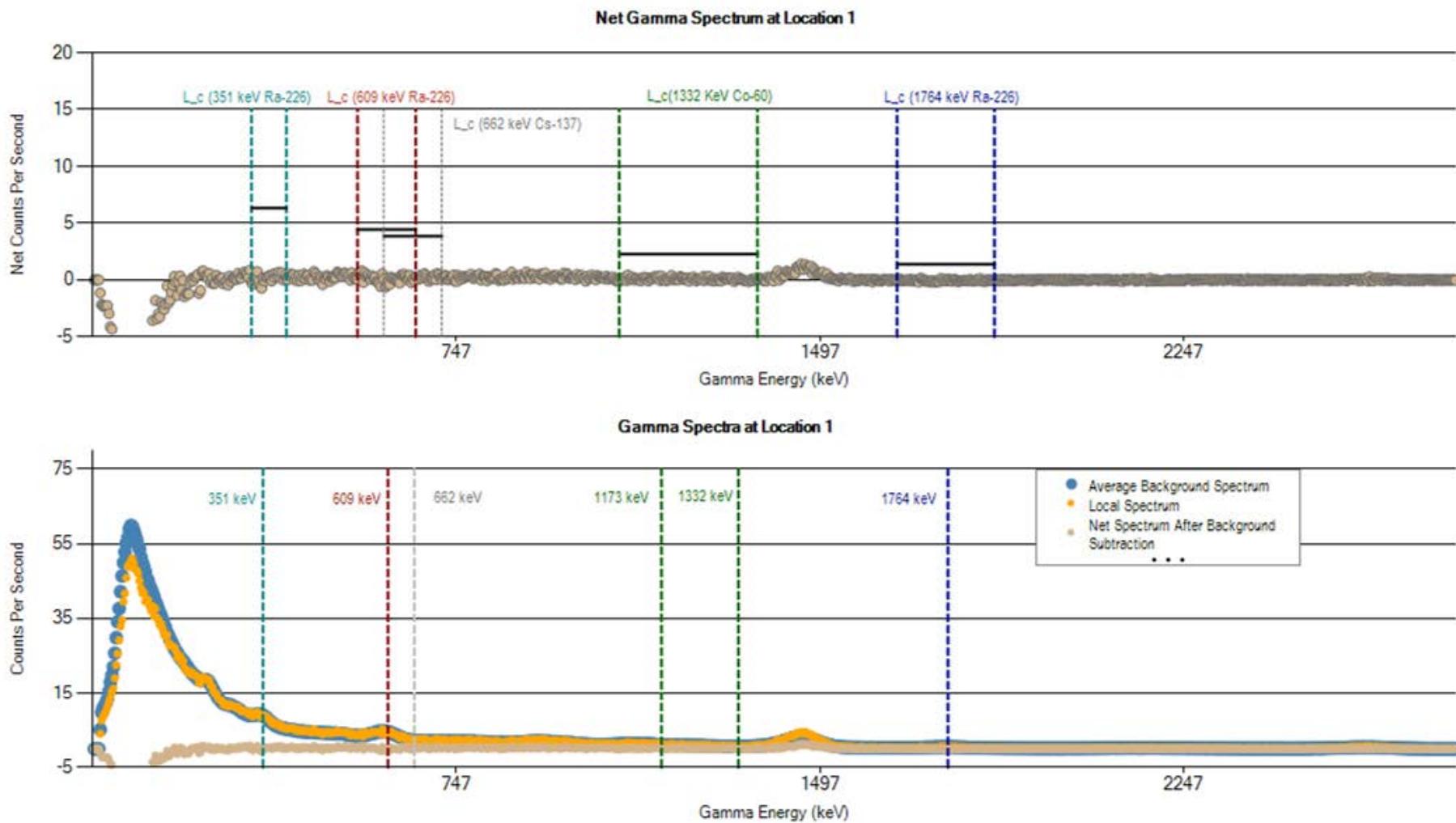
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Feet

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Serial Number:

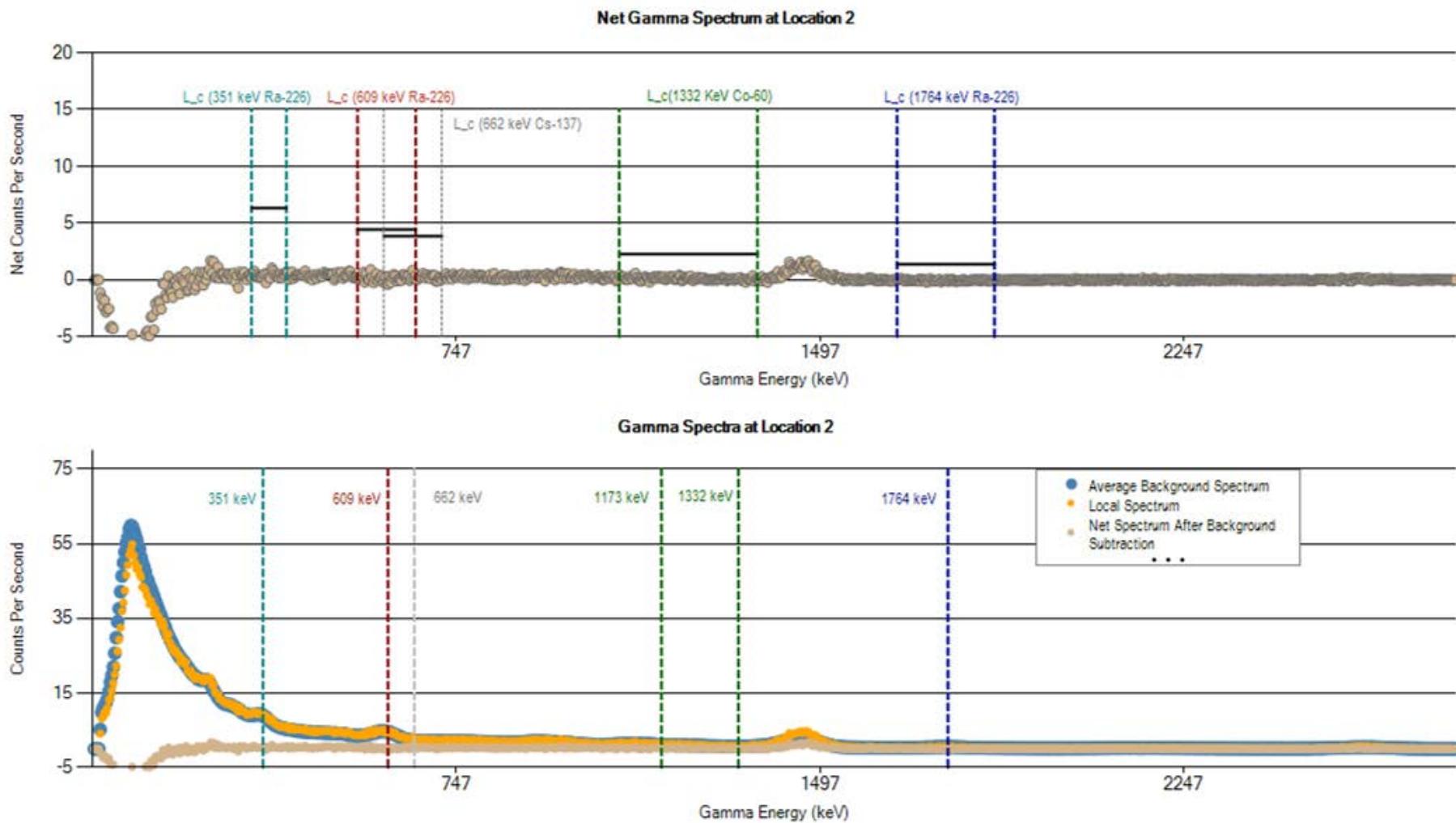
Coordinate system: CSP Zone III, NAD83, US Survey Foot

- S Systematic Sample Locations
- RS-700 GWS Scan Coverage
- RSY Pad Boundaries

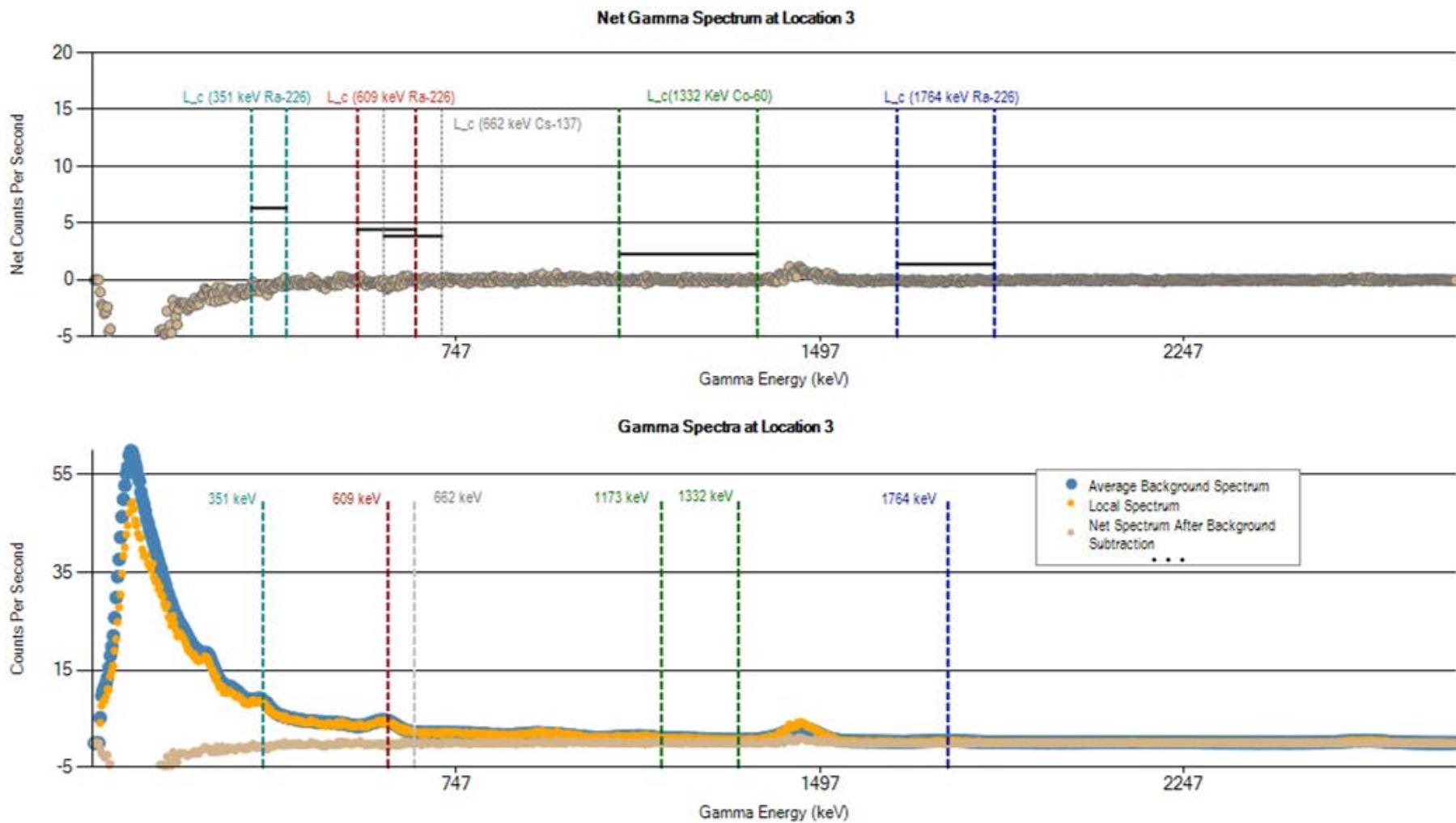




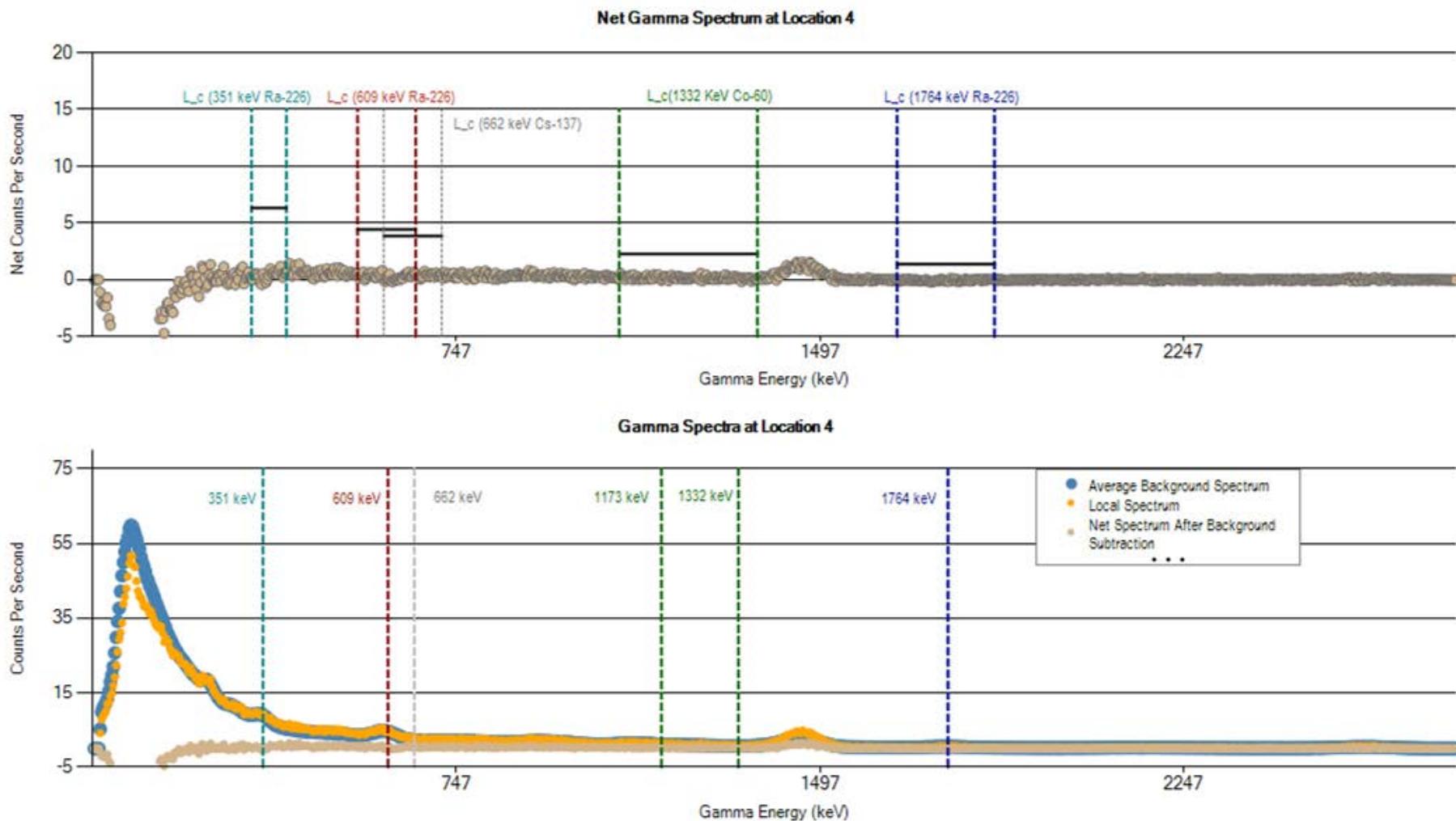
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Location 1 (cps)	953	138	22	25	165	153	118	188	101	3652
Static IL (cps)	1020	144	39	38	196	191	149	232	123	4270



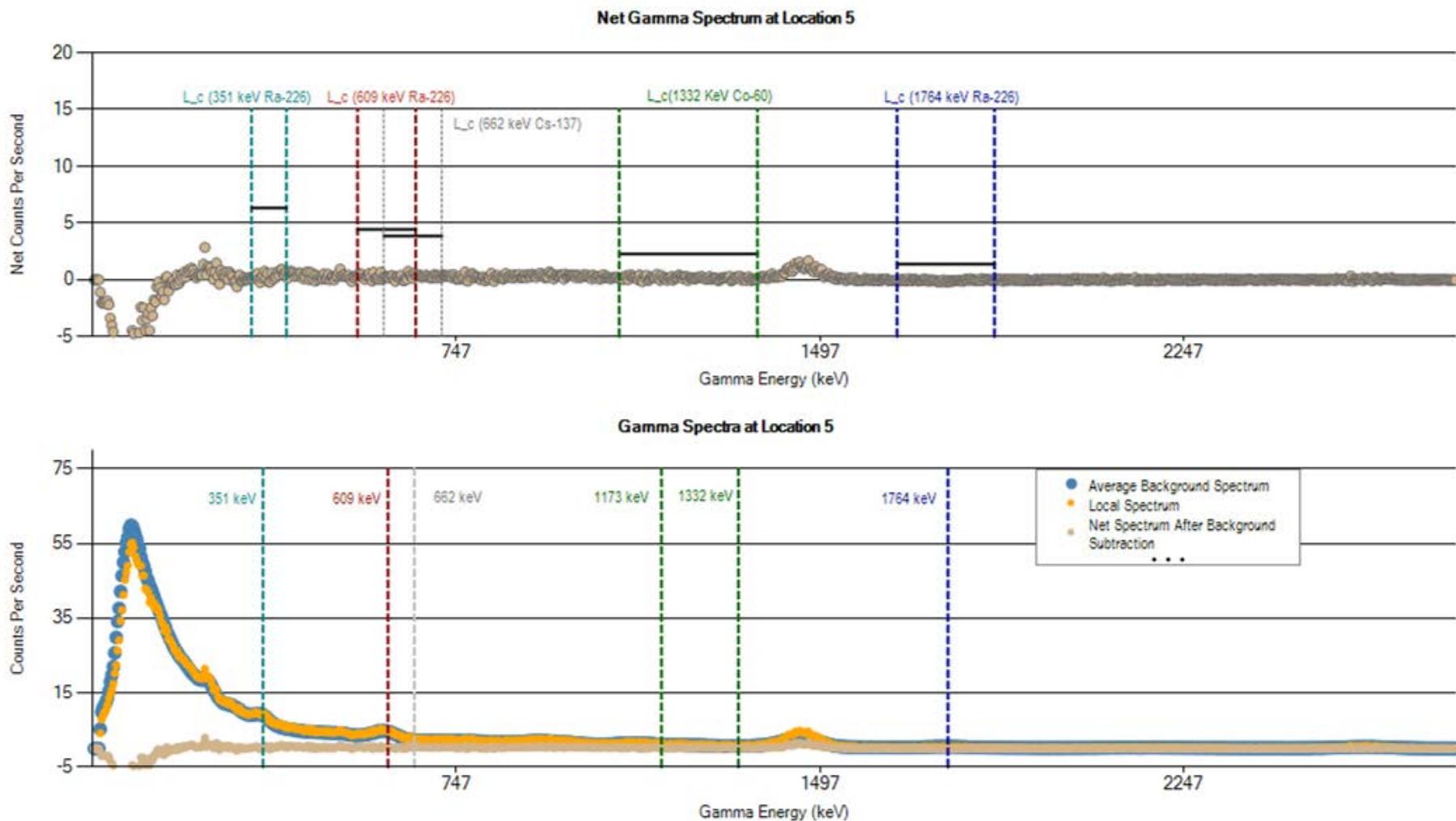
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Location 2 (cps)	981	146	22	26	169	156	121	194	104	3746
Static IL (cps)	1020	144	39	38	196	191	149	232	123	4270



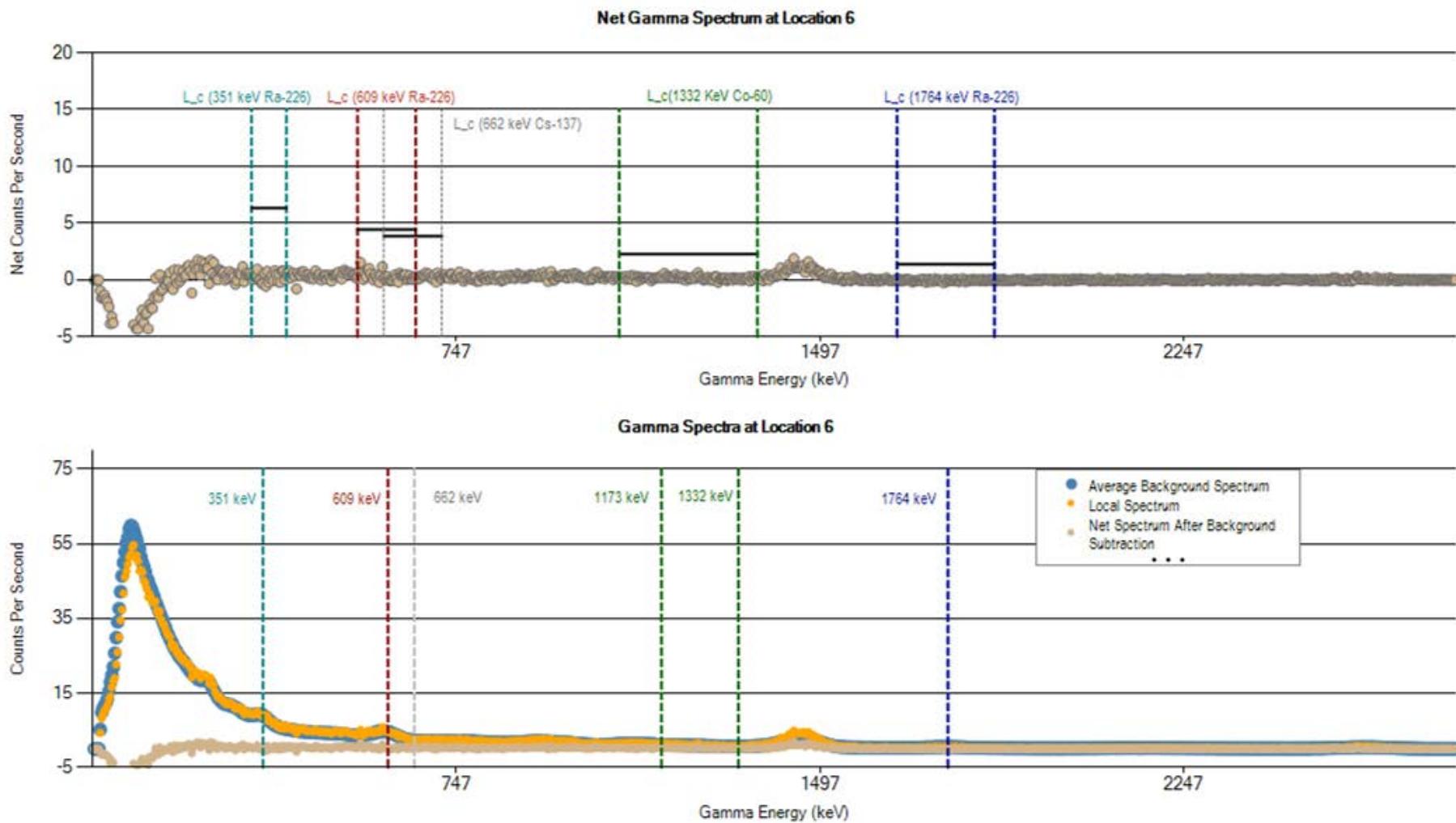
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Location 3 (cps)	868	130	19	24	147	141	107	170	92	3373
Static IL (cps)	1020	144	39	38	196	191	149	232	123	4270



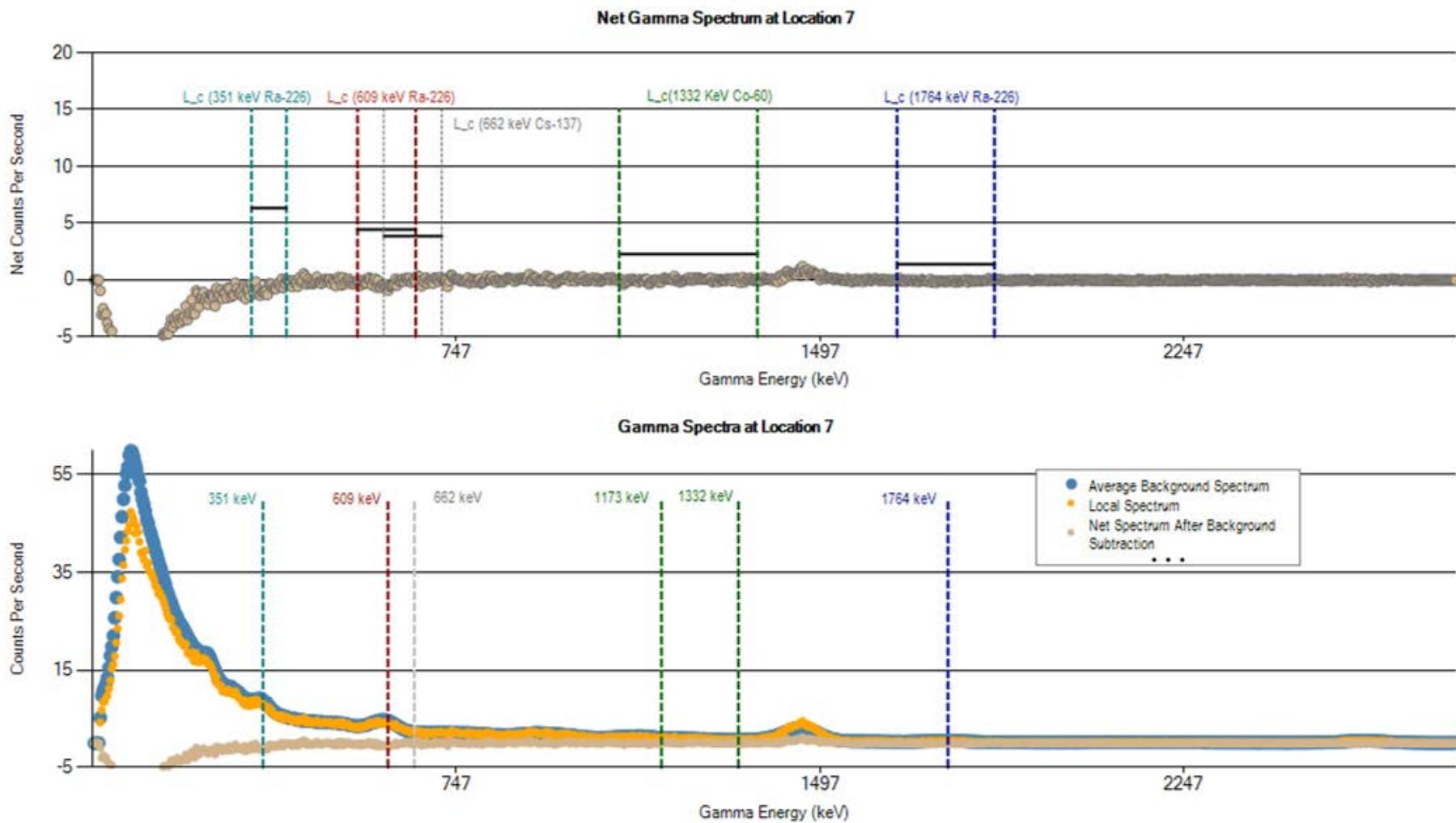
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Location 4 (cps)	1014	148	23	26	175	160	125	194	109	3662
Static IL (cps)	1020	144	39	38	196	191	149	232	123	4270



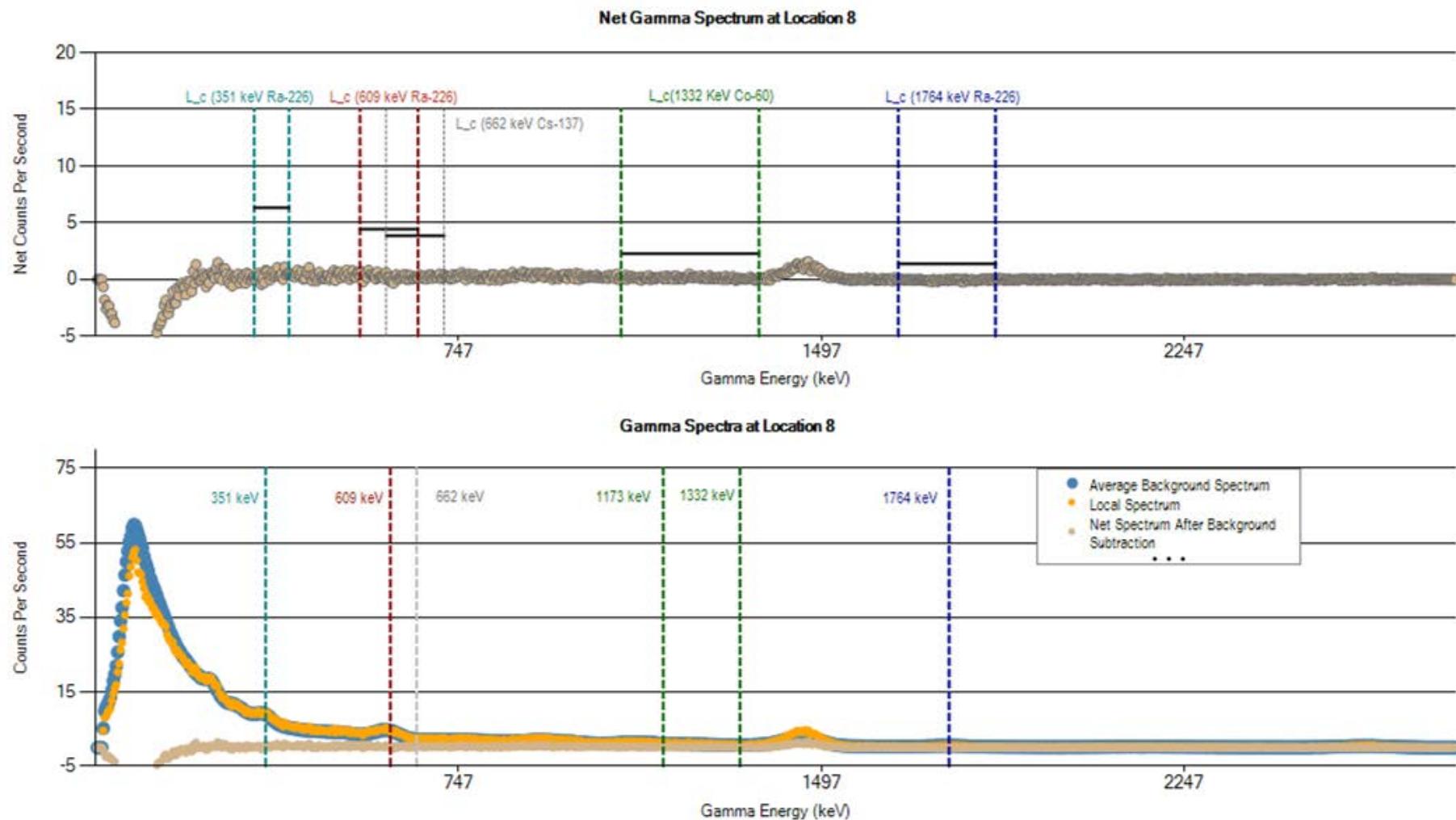
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Location 5 (cps)	983	146	22	26	165	159	124	192	107	3805
Static IL (cps)	1020	144	39	38	196	191	149	232	123	4270



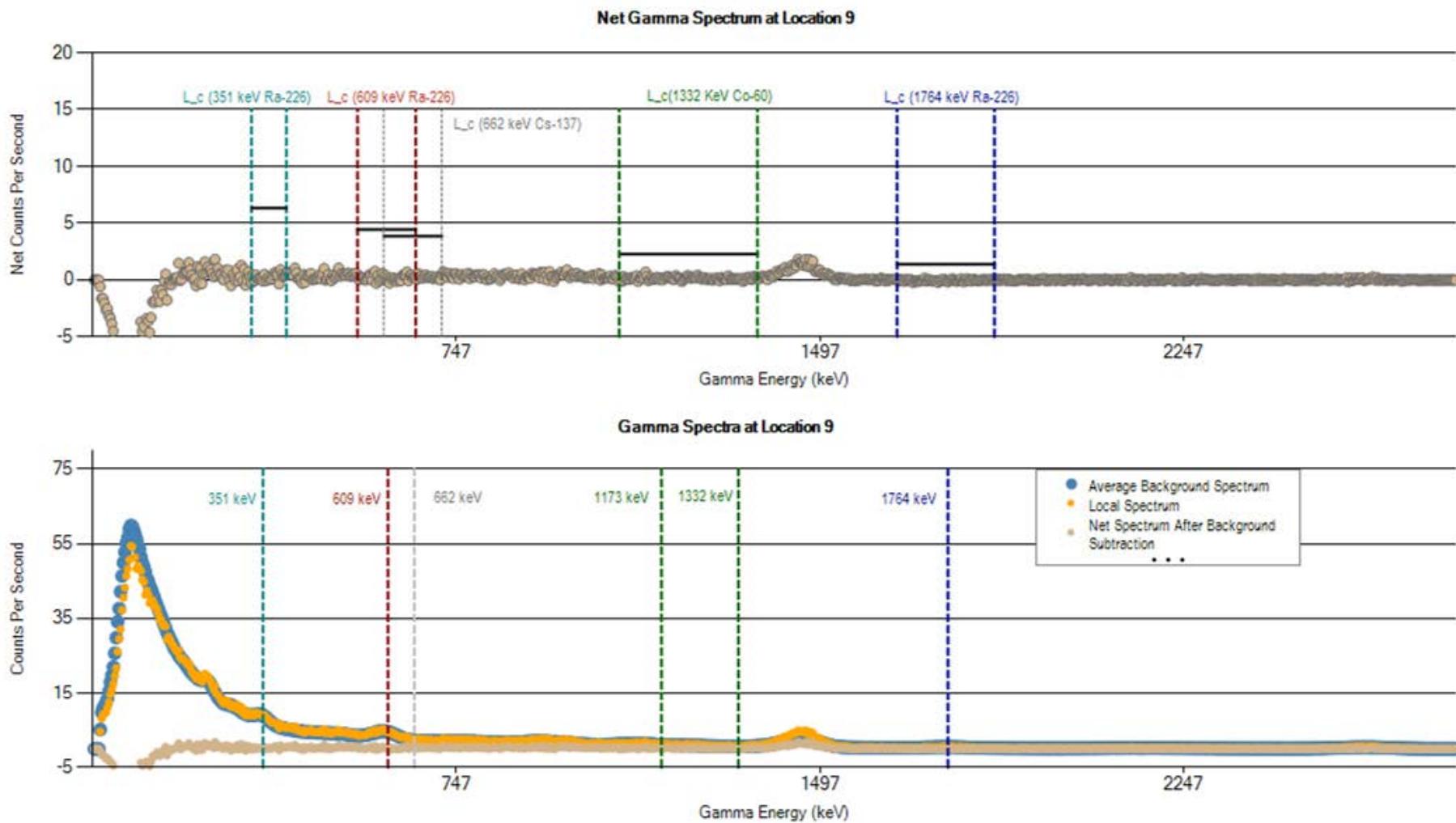
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Location 6 (cps)	989	147	22	26	172	162	123	190	108	3822
Static IL (cps)	1020	144	39	38	196	191	149	232	123	4270



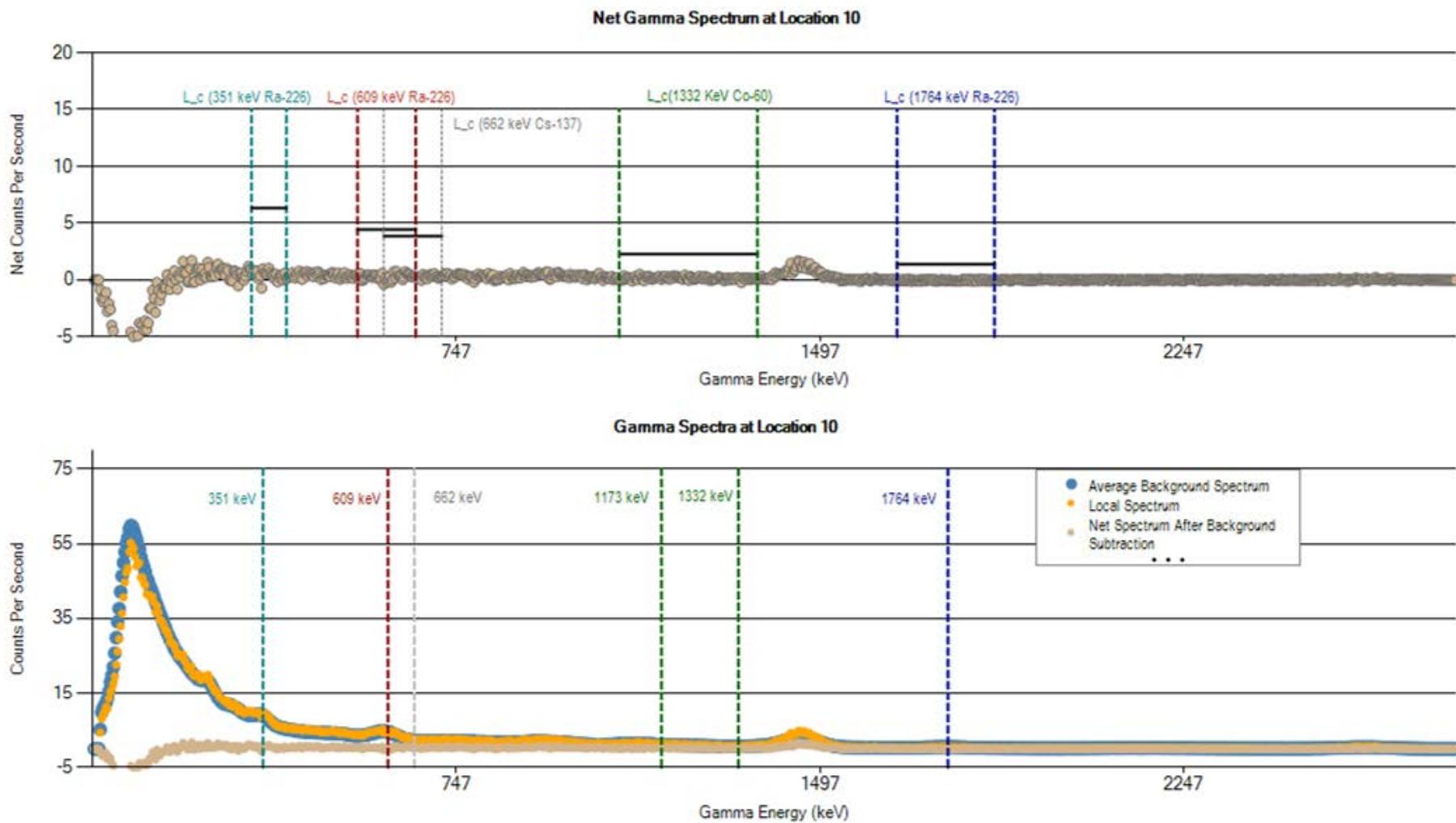
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Location 7 (cps)	867	129	20	22	150	139	108	167	92	3313
Static IL (cps)	1020	144	39	38	196	191	149	232	123	4270



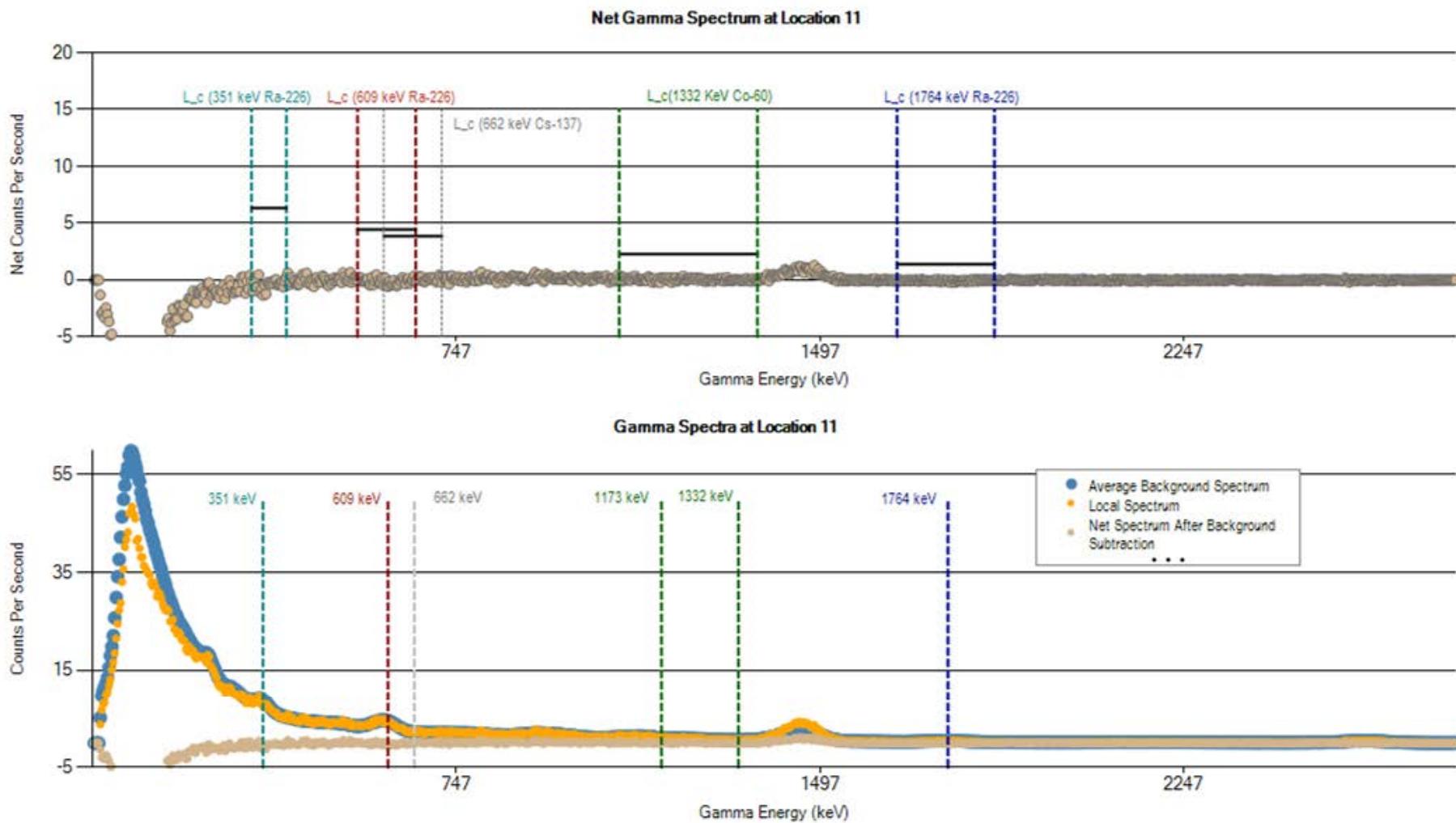
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 8 (cps)	979	145	22	25	168	158	121	193	105	3678
Static IL (cps)	1020	144	39	38	196	191	149	232	123	4270



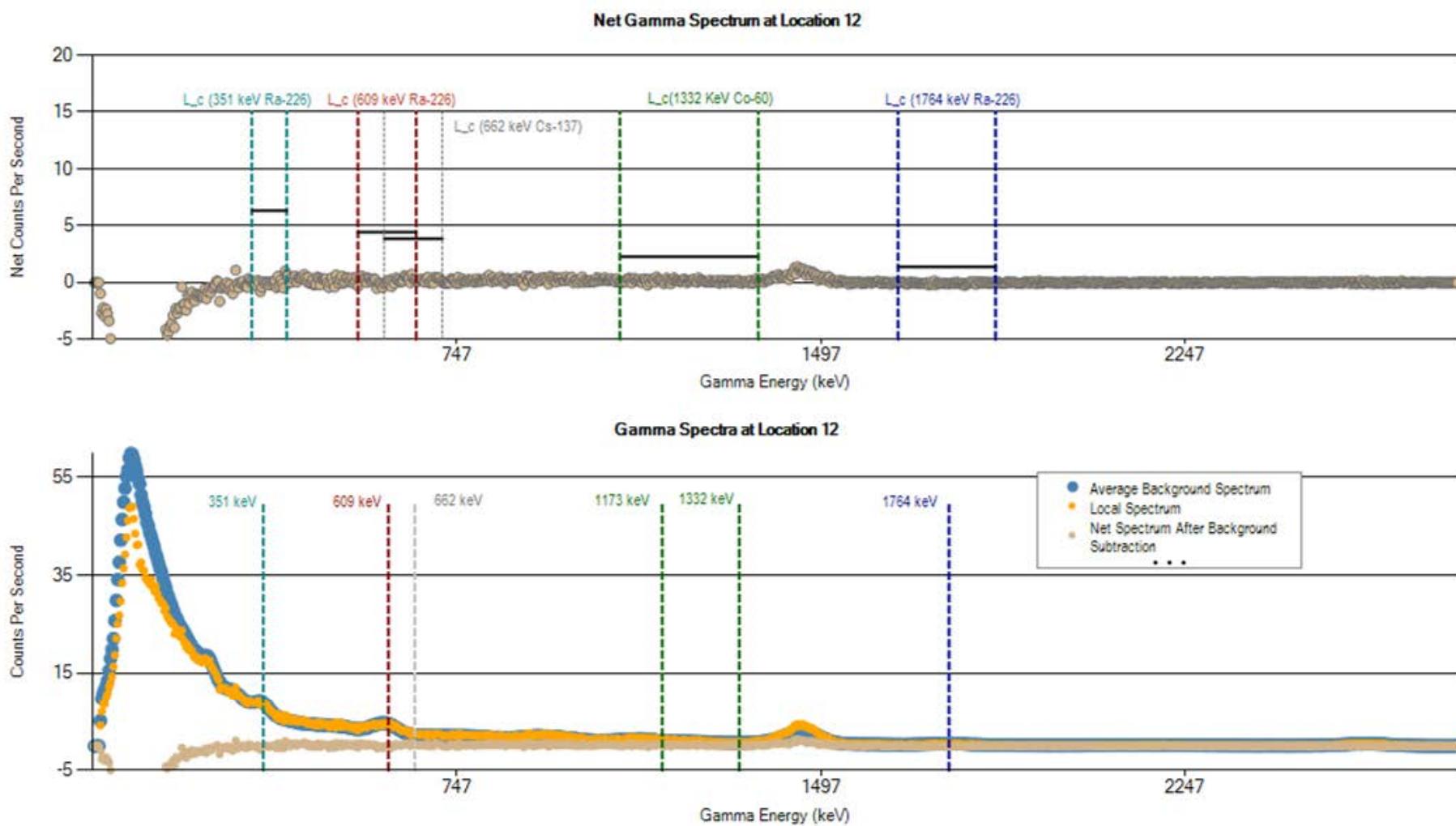
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 9 (cps)	997	153	22	26	167	156	122	191	106	3793
Static IL (cps)	1020	144	39	38	196	191	149	232	123	4270



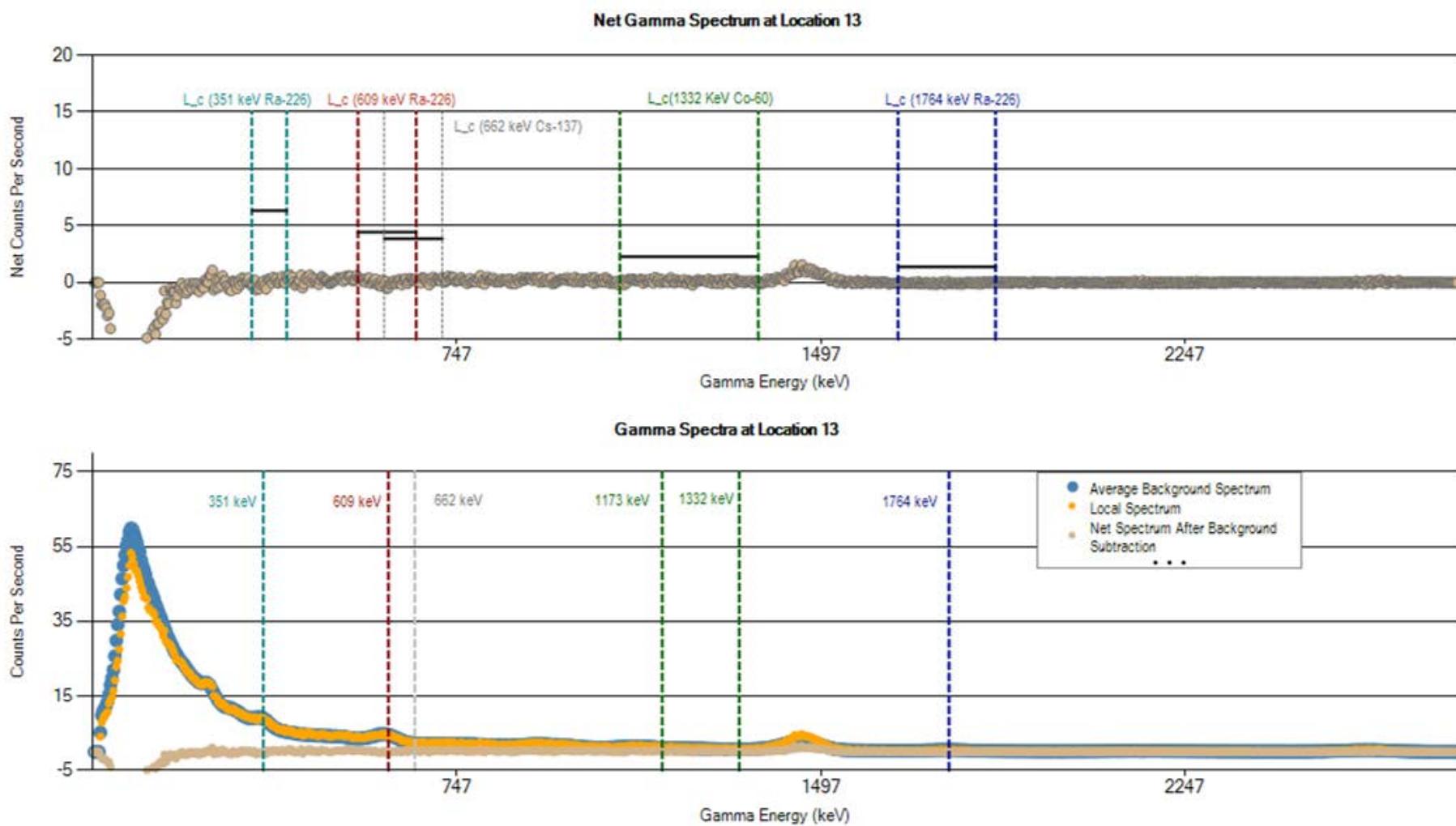
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Static IL (cps)	1020	144	39	38	196	191	149	232	123	4270



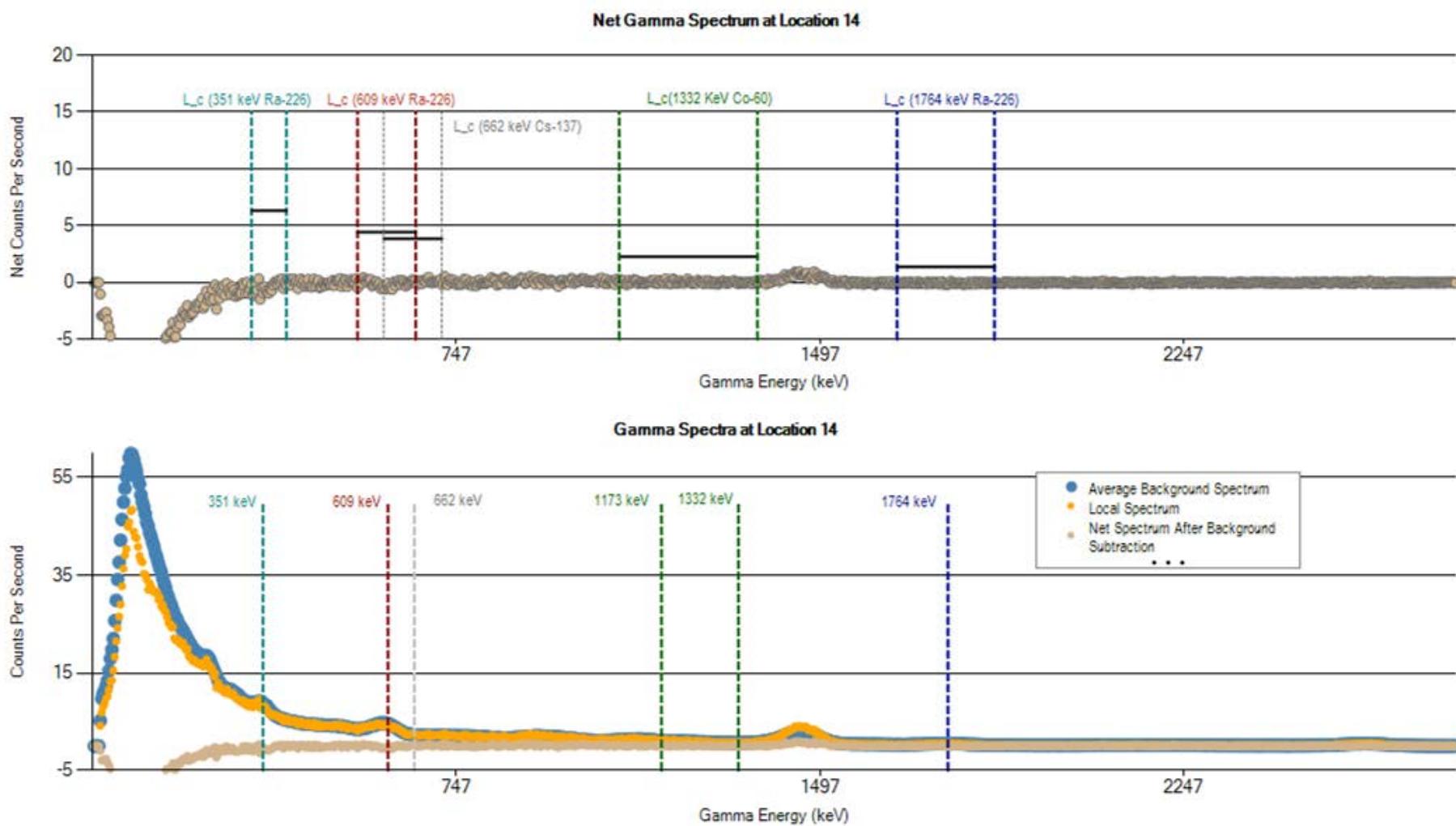
	ROI 1	ROI 2	ROI 3	ROI 4	ROI 5	ROI 6	ROI 7	ROI 8	ROI 9	ROI 10
Location 11 (cps)	907	140	20	21	154	143	111	174	96	3378
Static IL (cps)	1020	144	39	38	196	191	149	232	123	4270



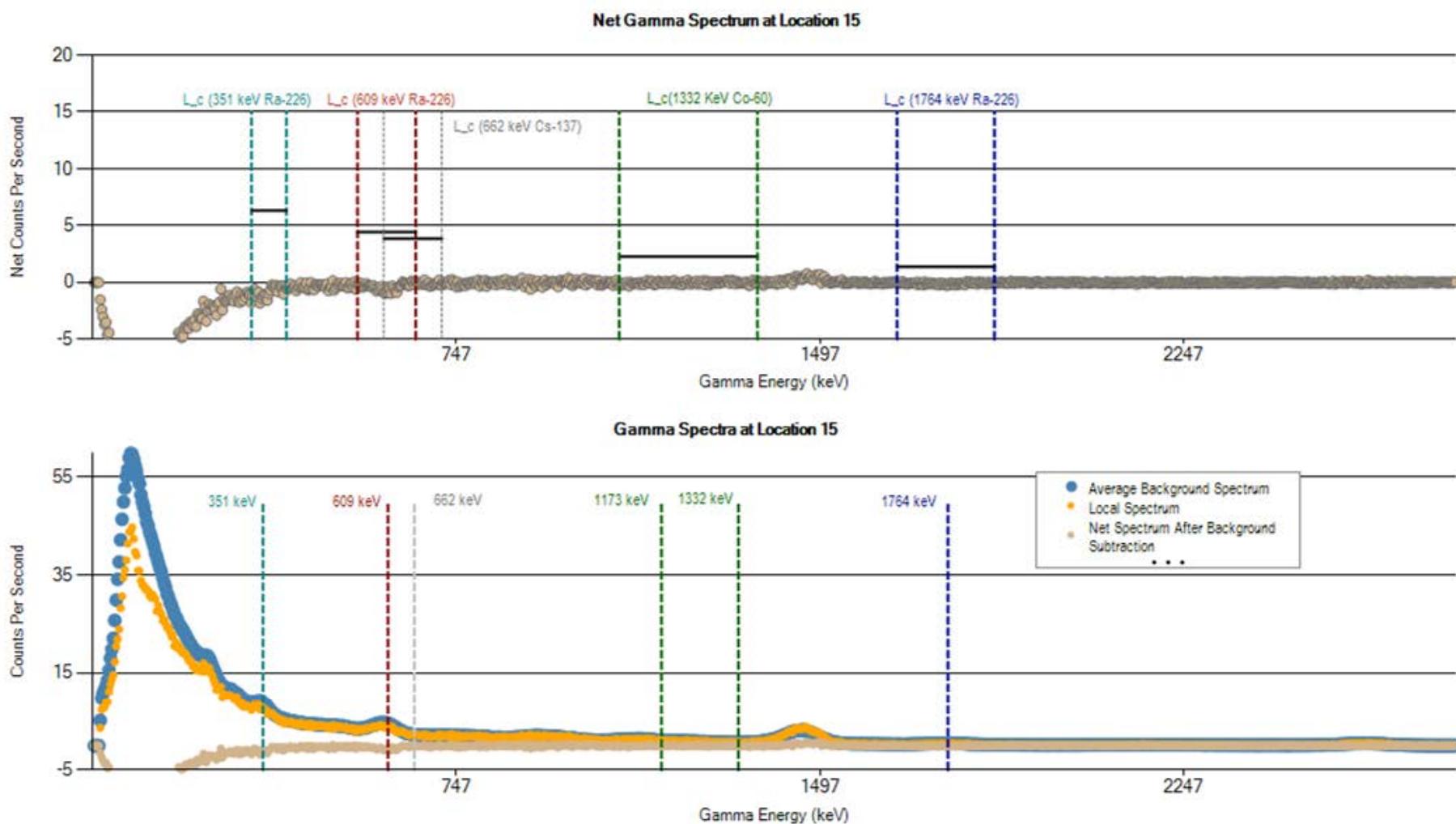
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 12 (cps)	954	140	22	23	161	155	121	184	106	3456
Static IL (cps)	1020	144	39	38	196	191	149	232	123	4270



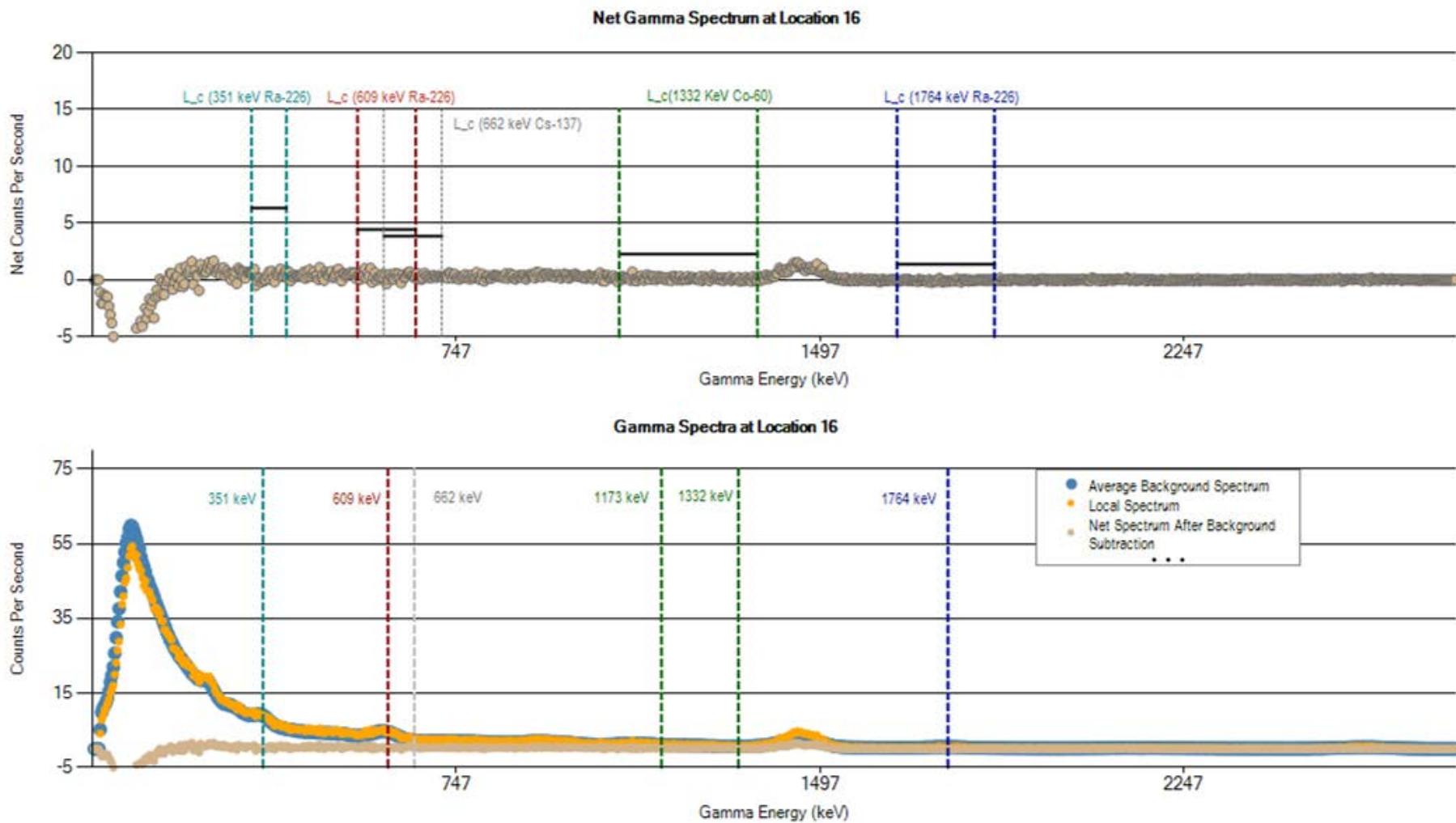
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 13 (cps)	955	143	22	25	164	152	118	184	104	3645
Static IL (cps)	1020	144	39	38	196	191	149	232	123	4270



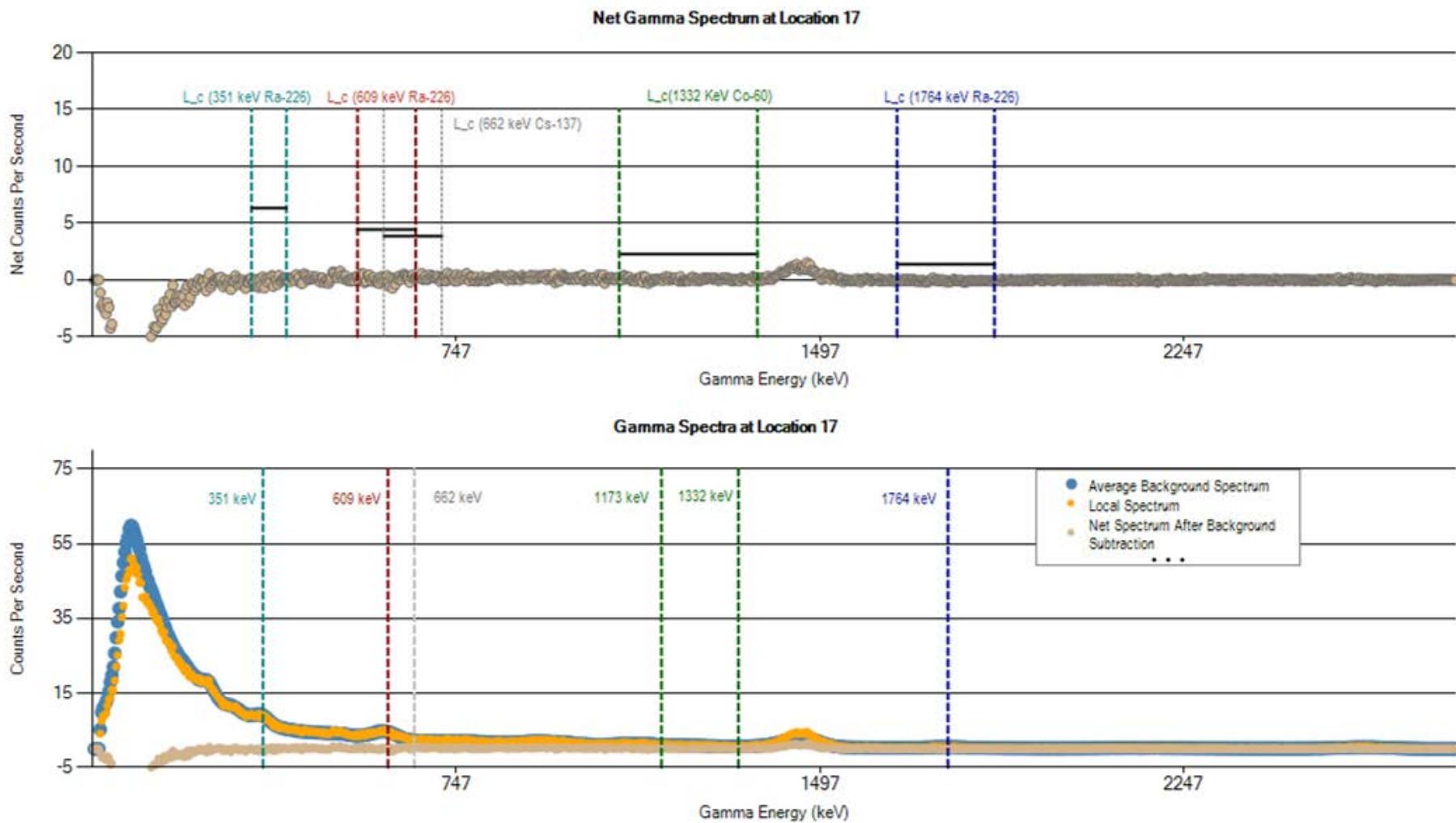
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 14 (cps)	899	132	22	22	155	146	112	174	96	3327
Static IL (cps)	1020	144	39	38	196	191	149	232	123	4270



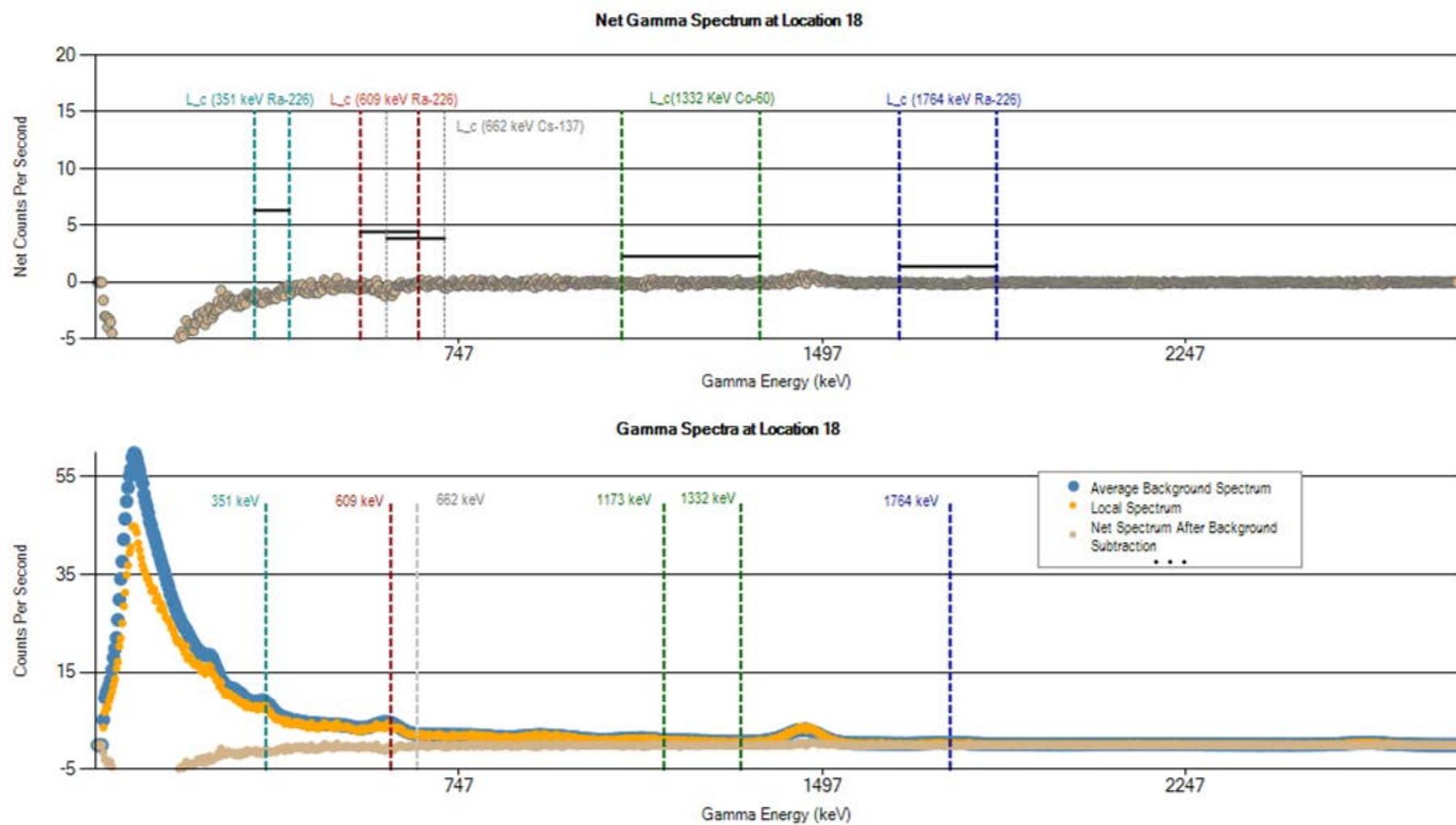
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 15 (cps)	831	121	19	22	143	133	102	164	90	3092
Static IL (cps)	1020	144	39	38	196	191	149	232	123	4270



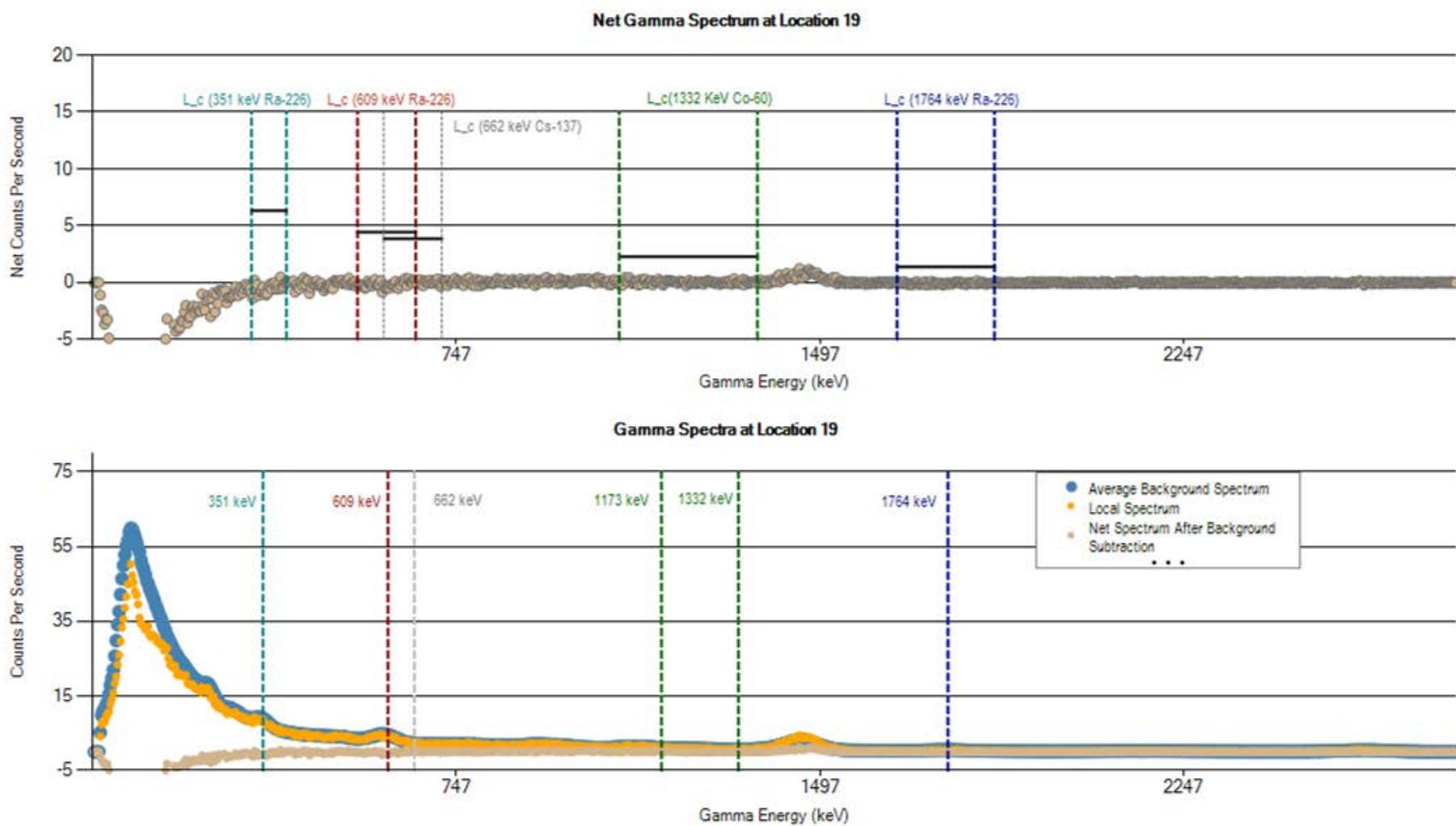
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 16 (cps)	997	149	22	26	172	162	125	192	105	3825
Static IL (cps)	1020	144	39	38	196	191	149	232	123	4270



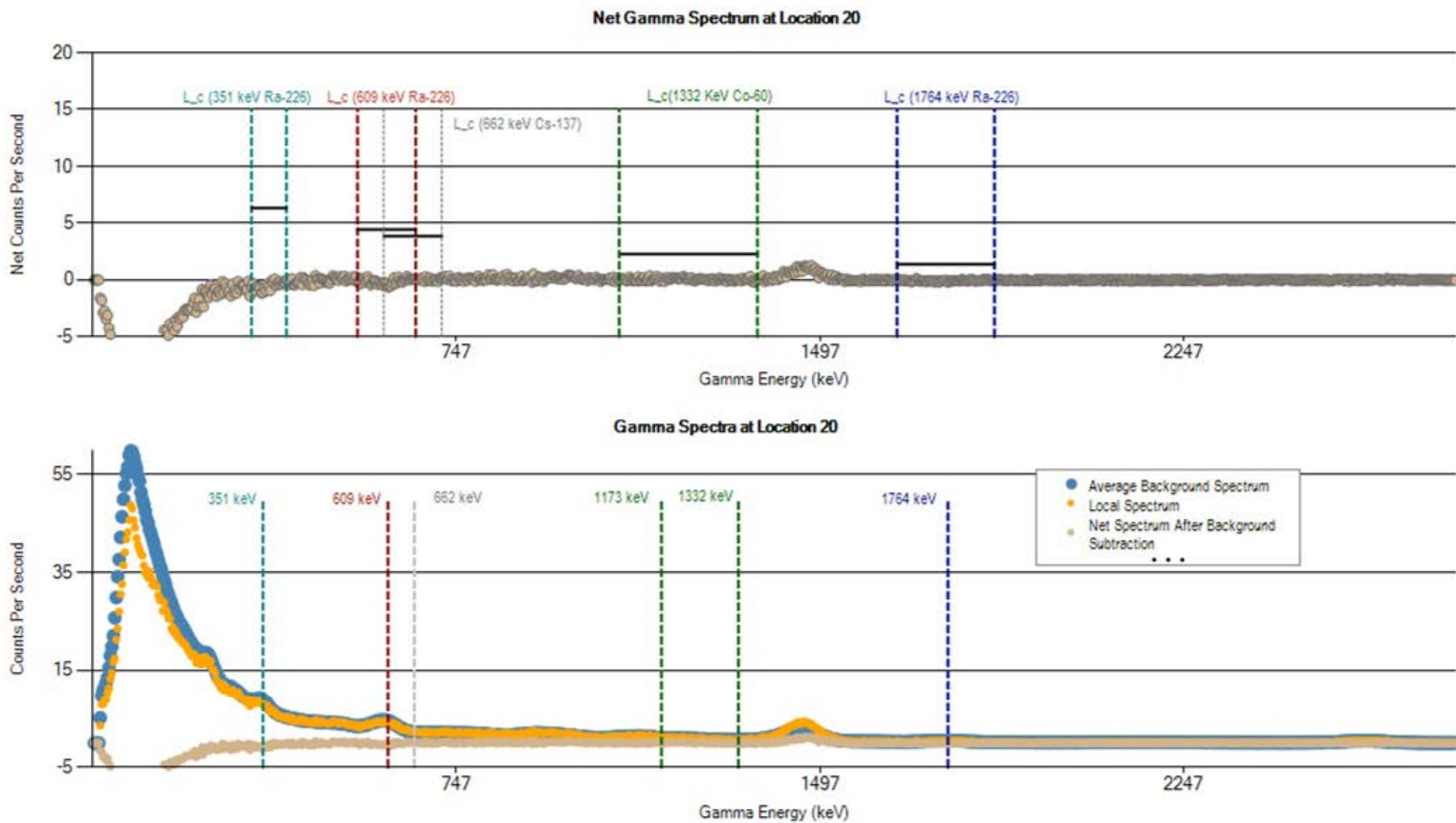
	ROI 1	ROI 2	ROI 3	ROI 4	ROI 5	ROI 6	ROI 7	ROI 8	ROI 9	ROI 10
Location 17 (cps)	937	141	21	24	160	152	118	182	99	3586
Static IL (cps)	1020	144	39	38	196	191	149	232	123	4270



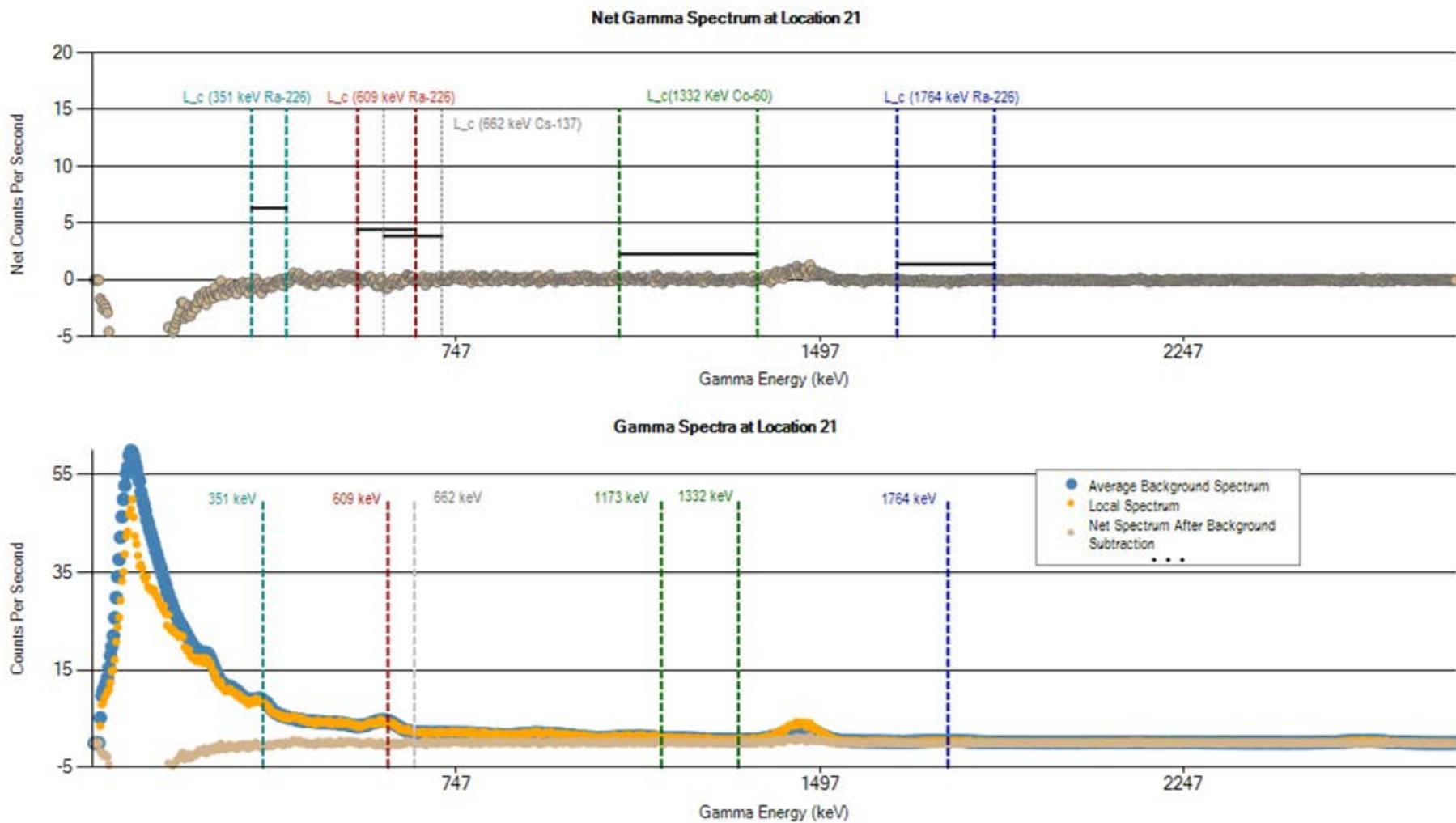
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 18 (cps)	802	118	18	20	140	130	101	156	86	3077
Static IL (cps)	1020	144	39	38	196	191	149	232	123	4270



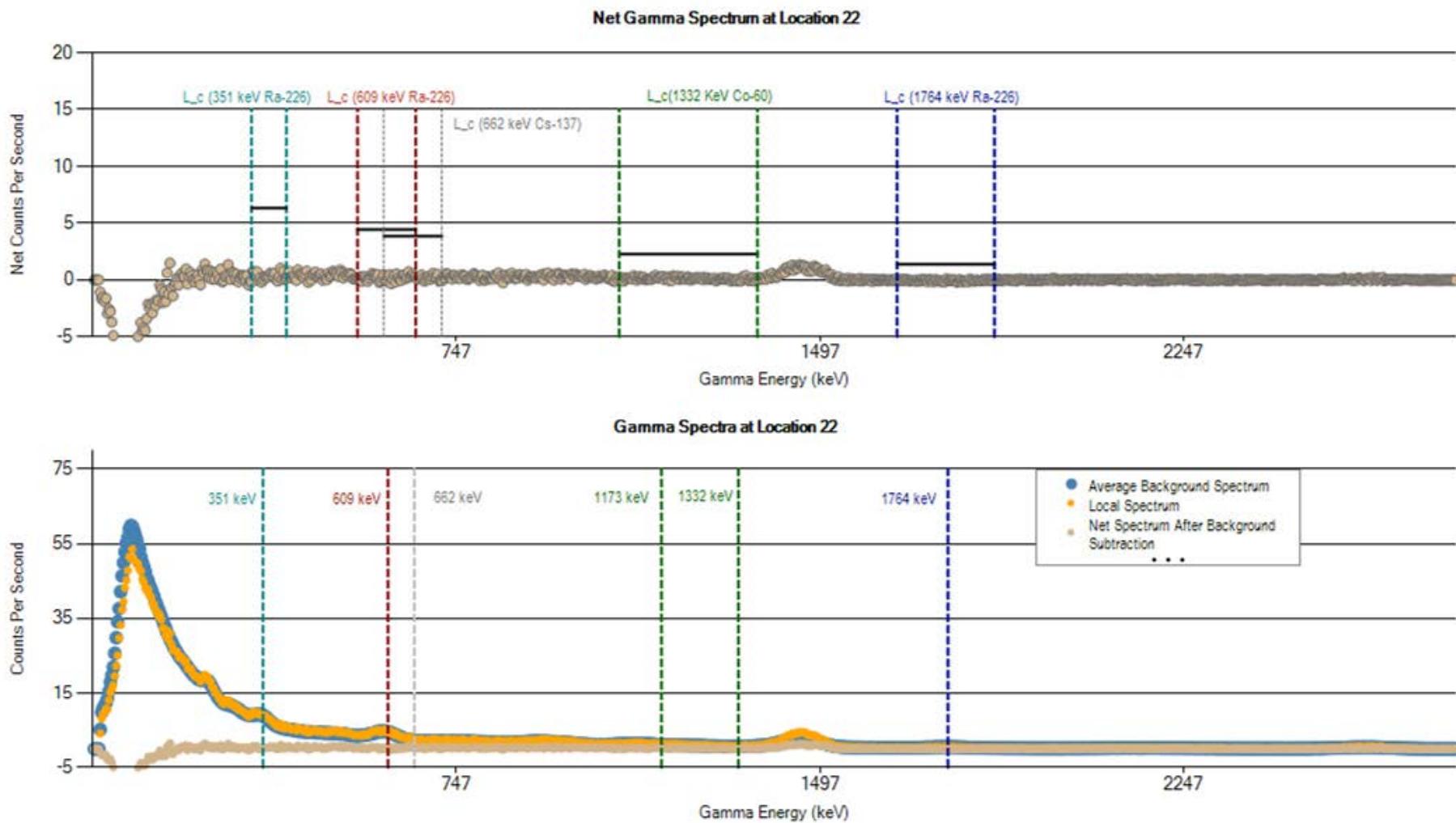
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 19 (cps)	887	133	20	22	148	142	111	173	97	3273
Static IL (cps)	1020	144	39	38	196	191	149	232	123	4270



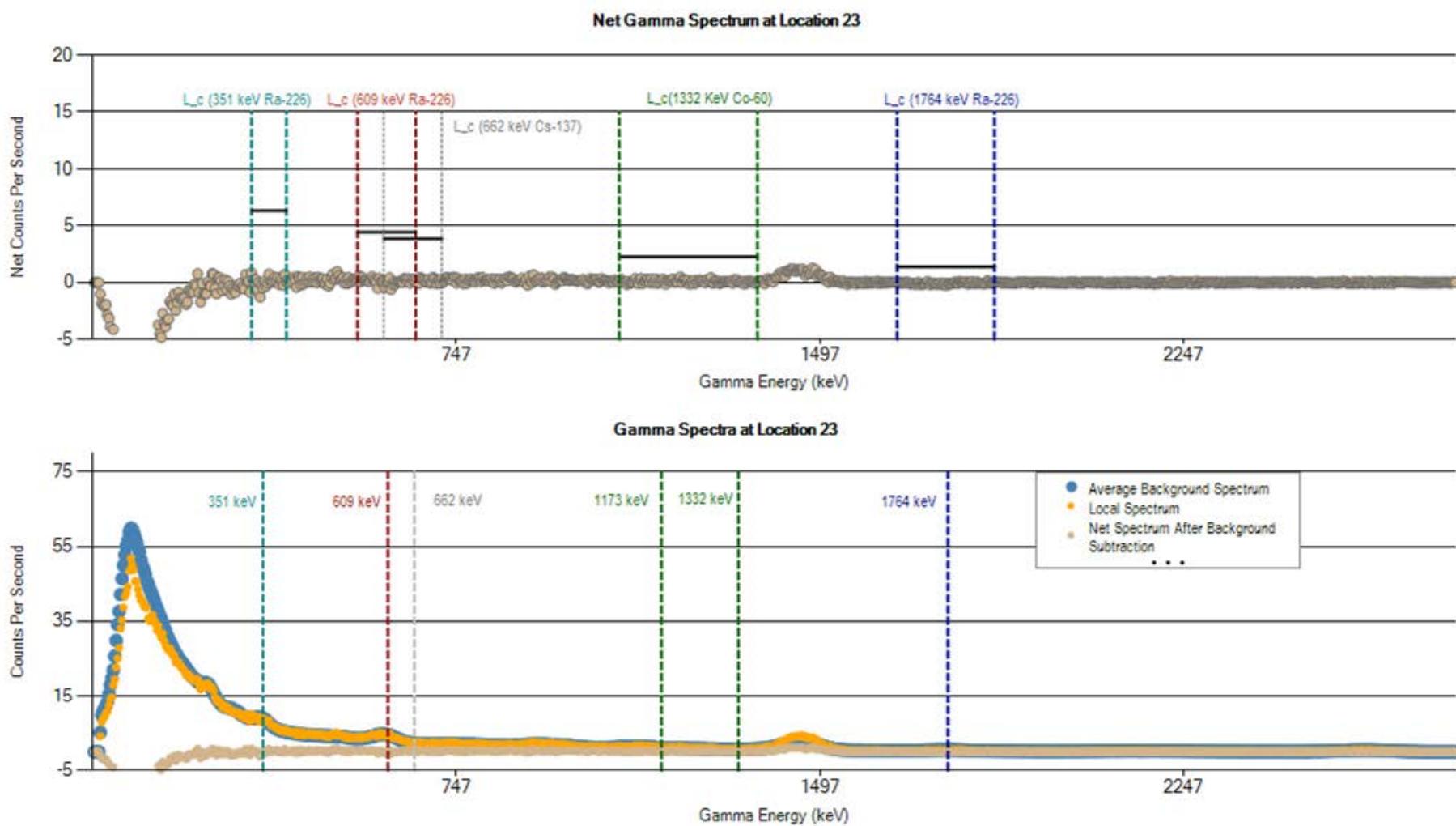
	ROI 1	ROI 2	ROI 3	ROI 4	ROI 5	ROI 6	ROI 7	ROI 8	ROI 9	ROI 10
Location 20 (cps)	905	138	21	24	155	143	112	172	97	3346
Static IL (cps)	1020	144	39	38	196	191	149	232	123	4270



	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 21 (cps)	909	136	21	23	157	144	110	174	98	3311
Static IL (cps)	1020	144	39	38	196	191	149	232	123	4270



	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 22 (cps)	983	148	22	26	167	157	121	192	104	3769
Static IL (cps)	1020	144	39	38	196	191	149	232	123	4270



	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 23 (cps)	952	144	21	24	164	153	117	184	102	3559
Static IL (cps)	1020	144	39	38	196	191	149	232	123	4270

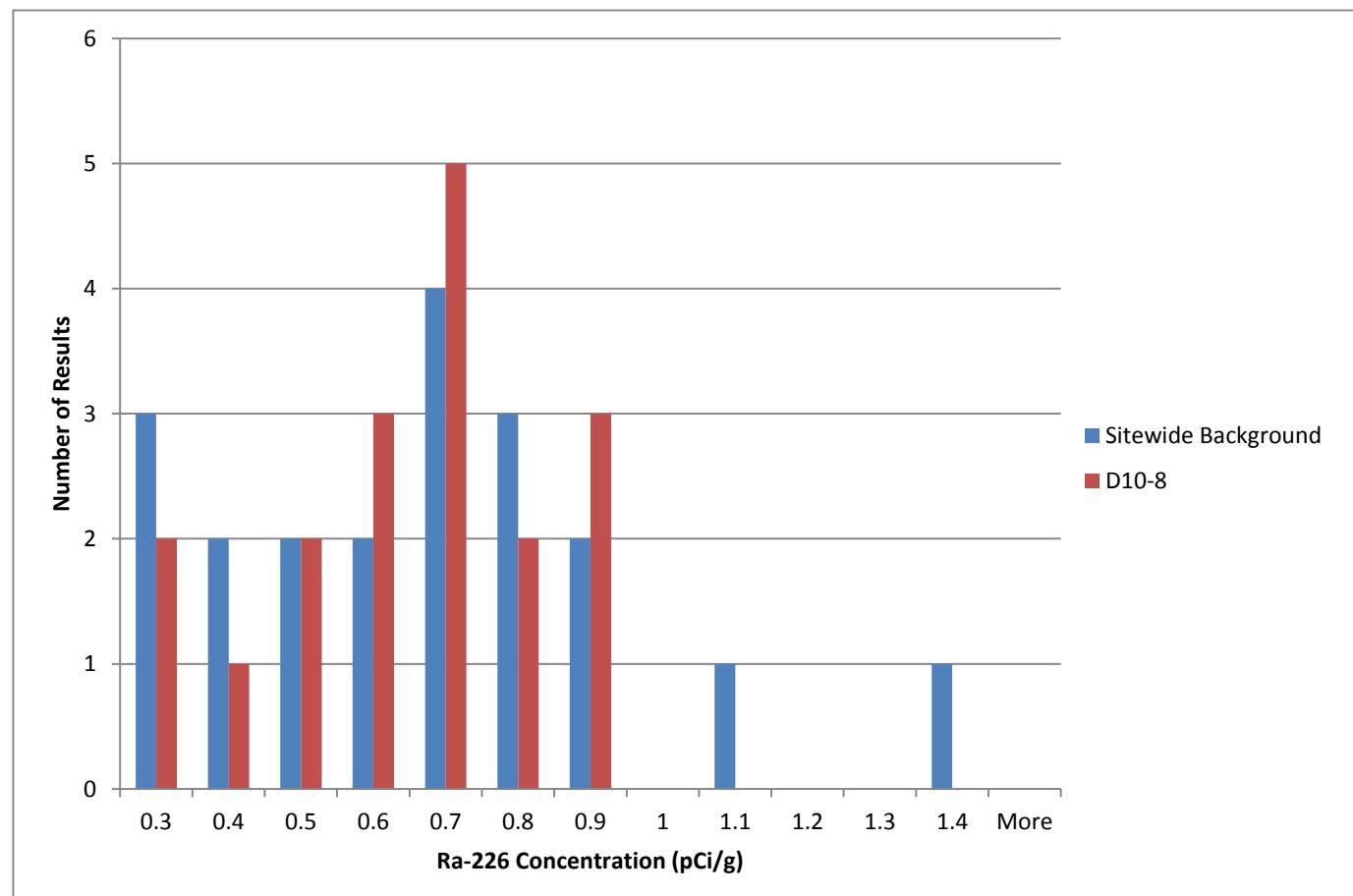
Histogram, RSY D10 (Use 8) vs. Sitewide Background

Background

Bin	Frequency
0.3	3
0.4	2
0.5	2
0.6	2
0.7	4
0.8	3
0.9	2
1	0
1.1	1
1.2	0
1.3	0
1.4	1
More	0

D10-8

Bin	Frequency
0.3	2
0.4	1
0.5	2
0.6	3
0.7	5
0.8	2
0.9	3
1	0
1.1	0
1.2	0
1.3	0
1.4	0
More	0



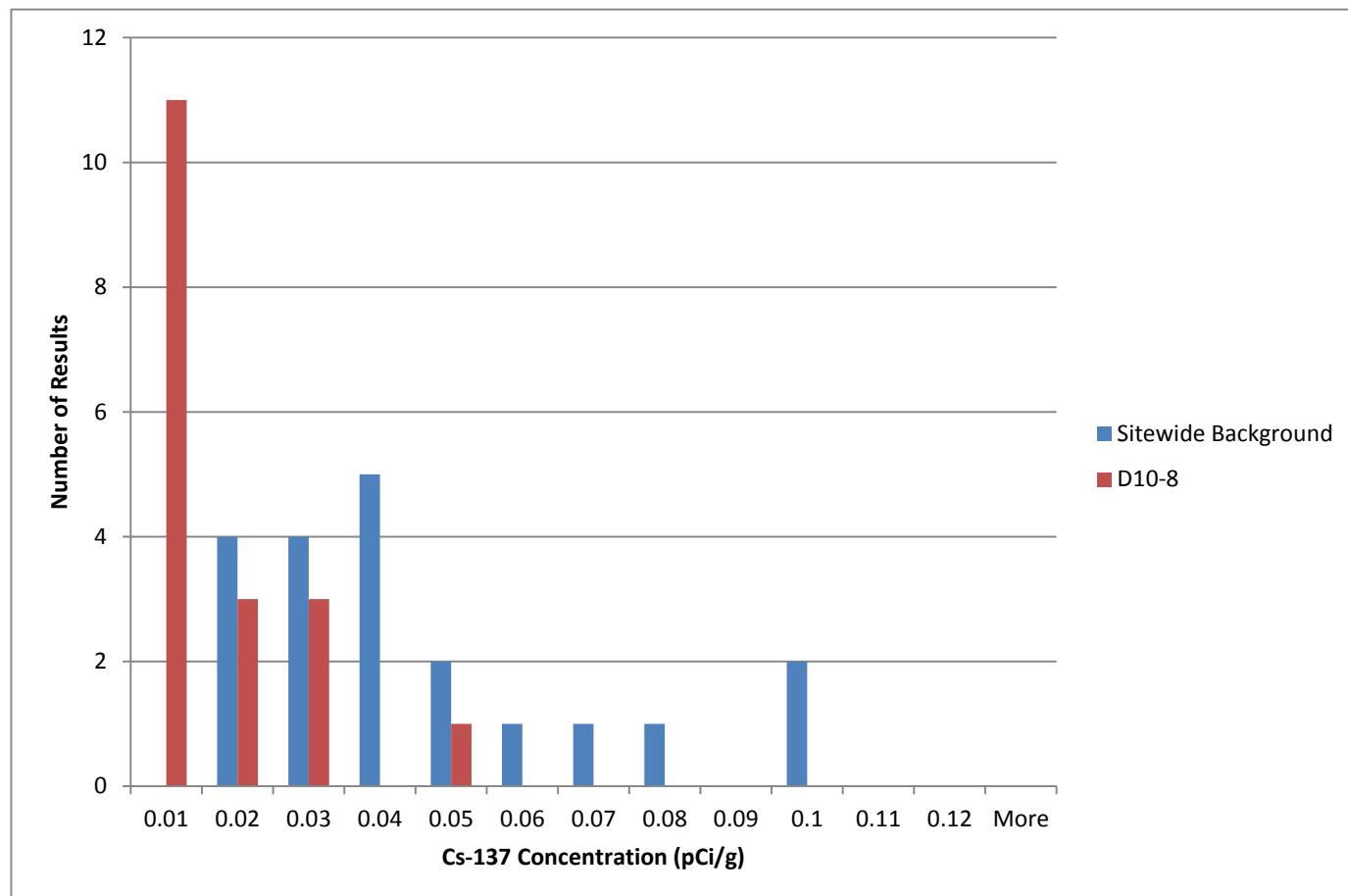
Histogram, RSY D10 (Use 8) vs. Sitewide Background

Background

Bin	Frequency
0.01	0
0.02	4
0.03	4
0.04	5
0.05	2
0.06	1
0.07	1
0.08	1
0.09	0
0.1	2
0.11	0
0.12	0
More	0

D10-8

Bin	Frequency
0.01	11
0.02	3
0.03	3
0.04	0
0.05	1
0.06	0
0.07	0
0.08	0
0.09	0
0.1	0
0.11	0
0.12	0
More	0



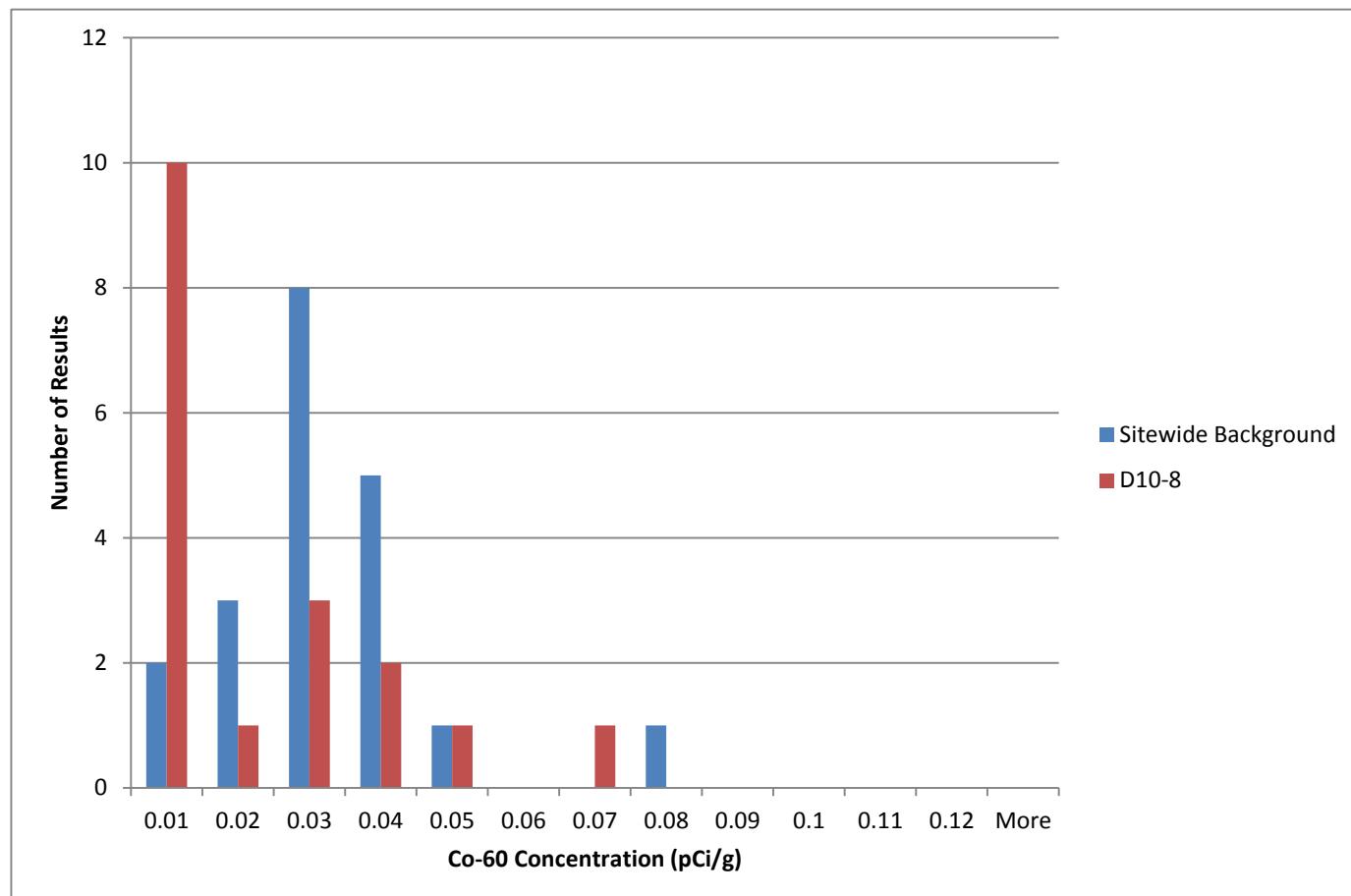
Histogram, RSY D10 (Use 8) vs. Sitewide Background

Background

Bin	Frequency
0.01	2
0.02	3
0.03	8
0.04	5
0.05	1
0.06	0
0.07	0
0.08	1
0.09	0
0.1	0
0.11	0
0.12	0
More	0

D10-8

Bin	Frequency
0.01	10
0.02	1
0.03	3
0.04	2
0.05	1
0.06	0
0.07	1
0.08	0
0.09	0
0.1	0
0.11	0
0.12	0
More	0



TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
Tel: (314)298-8566

TestAmerica Job ID: 160-29039-2

Client Project/Site: Hunters Point Naval Shipyard - Parcel E2

For:

Aptim Federal Services LLC
4005 Port Chicago Hwy, Suite 200
Concord, California 94520

Attn: Eddie Kalombo

Rhonda Ridenhower

Authorized for release by:

7/16/2018 9:40:18 AM

Rhonda Ridenhower, Manager of Project Management
(314)298-8566

rhonda.ridenhower@testamericainc.com

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Expert

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This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Case Narrative

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29039-2

Job ID: 160-29039-2

Laboratory: TestAmerica St. Louis

Narrative

CASE NARRATIVE

Client: Aptim Federal Services LLC

Project: Hunters Point Naval Shipyard - Parcel E2

Report Number: 160-29039-2

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

TestAmerica St. Louis attests to the validity of the laboratory data generated by TestAmerica facilities reported herein. All analyses performed by TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Manual Integrations were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.

The following clean-up methods for Organic analyses may have been used on the samples in this data set. Specific methods employed are documented on the batch extraction logs:

Method 3600C: Cleanup

Method 3620C: Florisil Cleanup

Method 3630C: Silica Gel Cleanup

Method 3640A: Gel-Permeation Cleanup

Method 3650B: Acid-Base Partition Cleanup

Method 3660B: Sulfur Cleanup

Case Narrative

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29039-2

Job ID: 160-29039-2 (Continued)

Laboratory: TestAmerica St. Louis (Continued)

Method 3665A: Sulfuric Acid/Permanganate Cleanup

This laboratory report is confidential and is intended for the sole use of TestAmerica and its client.

RECEIPT

The samples were received on 06/18/2018; the samples arrived in good condition, properly preserved. The temperature of the coolers at receipt was 19.0 C.

TOTAL BETA STRONTIUM (GFPC)

Samples PE2-RSYD10-U8-S001 (160-29039-1) and PE2-RSYD10-U8-S011 (160-29039-11) were analyzed for Total Beta Strontium (GFPC) in accordance with EPA 905. The samples were dried on 06/19/2018, prepared on 06/25/2018 and analyzed on 07/11/2018.

The following samples could not be thoroughly homogenized before sub-sampling was performed due to sample matrix:

PE2-RSYD10-U8-S001 (160-29039-1) and PE2-RSYD10-U8-S011 (160-29039-11). The samples contained rocks of varying sizes.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

RADIUM-226 BY GAMMA SPEC (21 DAY INGROWTH)

Samples PE2-RSYD10-U8-S001 (160-29039-1), PE2-RSYD10-U8-S002 (160-29039-2), PE2-RSYD10-U8-S003 (160-29039-3), PE2-RSYD10-U8-S004 (160-29039-4), PE2-RSYD10-U8-S005 (160-29039-5), PE2-RSYD10-U8-S006 (160-29039-6), PE2-RSYD10-U8-S007 (160-29039-7), PE2-RSYD10-U8-S008 (160-29039-8), PE2-RSYD10-U8-S009 (160-29039-9), PE2-RSYD10-U8-S010 (160-29039-10), PE2-RSYD10-U8-S011 (160-29039-11), PE2-RSYD10-U8-S012 (160-29039-12), PE2-RSYD10-U8-S013 (160-29039-13), PE2-RSYD10-U8-S014 (160-29039-14), PE2-RSYD10-U8-S015 (160-29039-15), PE2-RSYD10-U8-S016 (160-29039-16), PE2-RSYD10-U8-S017 (160-29039-17) and PE2-RSYD10-U8-S018 (160-29039-18) were analyzed for Radium-226 by gamma spec (21 day ingrowth) in accordance with EPA GA_01_R. The samples were dried on 06/19/2018, prepared on 06/21/2018 and analyzed on 07/12/2018.

The cesium-137 detection goal of 0.0700 pCi/g was not met. This is caused by statistical fluctuations in the Compton background due to low level activity in the samples in conjunction with the software attempting to fit a peak into the noise of this baseline.

PE2-RSYD10-U8-S002 (160-29039-2), PE2-RSYD10-U8-S005 (160-29039-5), PE2-RSYD10-U8-S006 (160-29039-6), PE2-RSYD10-U8-S011 (160-29039-11), PE2-RSYD10-U8-S013 (160-29039-13) and PE2-RSYD10-U8-S015 (160-29039-15)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.



CHAIN OF CUSTODY

APTIM Federal Services, LLC
4005 Port Chicago Hwy
Concord, CA 94520

Project Number: 500506

CTO-013 RSYD10 USE 8 Freshwater

Wetlands Over-excavation Systematic

Project Name: HillNS - Parcel E-2

Project Location: HillNS

Purchase Order #: 202296

Shipment/Pickup Date: **6/15/18**

Waybill Number: **12613951592**

Lab Destination: Test America (St. Louis Lab)
13715 Rider Trail North
Earth City, MO 63045

Lab Contact Name / ph. #: Rhonda Ridenhower (314) 298-8566

Sampler's Name(s): **Rhonda Ridenhower**

Send Report To:	<i>Eddie Kalombo</i>
Phone/Fax Number:	415-987-0760
Address:	4005 Port Chicago Hwy
City:	Concord, CA, 94520

Sample ID Number	Sample Description	Date	Time	Method	Matrix	Preservative (soil)	Preservative (water)	Container Type	Container #	Analyses Requested
PE2-RSYD10-U8-S011	Parcel E-2 RSYD10 USE 8 Systematic	6/13/18	13:00	G	SO	1	16 oz. plastic jar	X	X	Total Strontium (EPA 905 MOD)
PE2-RSYD10-U8-S012	Parcel E-2 RSYD10 USE 8 Systematic	6/13/18	13:05	G	SO	1	16 oz. plastic jar	X	X	Strontium 90 (EPA 905 MOD)
PE2-RSYD10-U8-S013	Parcel E-2 RSYD10 USE 8 Systematic	6/14/18	09:18	G	SO	1	16 oz. plastic jar	X	X	Gamma Spec (EPA 1911 M)
PE2-RSYD10-U8-S014	Parcel E-2 RSYD10 USE 8 Systematic	6/14/18	09:21	G	SO	1	16 oz. plastic jar	X	X	Full 21 day in-growth preliminary results and full gamma results (7 day in-growth preliminary results and full gamma results)
PE2-RSYD10-U8-S015	Parcel E-2 RSYD10 USE 8 Systematic	6/14/18	09:24	G	SO	1	16 oz. plastic jar	X	X	
PE2-RSYD10-U8-S016	Parcel E-2 RSYD10 USE 8 Systematic	6/14/18	09:27	G	SO	1	16 oz. plastic jar	X	X	
PE2-RSYD10-U8-S017	Parcel E-2 RSYD10 USE 8 Systematic	6/14/18	09:30	G	SO	1	16 oz. plastic jar	X	X	
PE2-RSYD10-U8-S018	Parcel E-2 RSYD10 USE 8 Systematic	6/14/18	09:33	G	SO	1	16 oz. plastic jar	X	X	

Special Instructions:

Analyze for Total Strontium as a screening step, and isotopic Sr-90 only if Total Strontium is above project action limit of 0.331 pCi/g.

Standard TAT -10-day	24-hr	3-day	10-day	I	II	III	Project Specific:	Level Of QC Required:	Method Codes	C = Composite	G = Grab
Retain/Released By: <i>Jessica Ramirez</i>	Date: 6/14/18	Date: 6/14/18	Date: 6/14/18	Received By: <i>Jessica Ramirez</i>	Date: 6/14/18	Date: 6/14/18	Date: 6/14/18	Time: 1:52PM	Time: 1:52PM	Time: 1:52PM	Time: 1:52PM
Retain/Released By: <i>Dawn Long Dyer</i>	Date: 6/15/18	Date: 6/15/18	Date: 6/15/18	Received By: <i>UPS</i>	Date: 6/15/18	Date: 6/15/18	Date: 6/15/18	Time: 1:53PM	Time: 1:53PM	Time: 1:53PM	Time: 1:53PM
Retain/Released By: <i>Dawn Long Dyer</i>	Date: 6/15/18	Date: 6/15/18	Date: 6/15/18	Received By: <i>UPS</i>	Date: 6/15/18	Date: 6/15/18	Date: 6/15/18	Time: 1:53PM	Time: 1:53PM	Time: 1:53PM	Time: 1:53PM
Retain/Released By: <i>Dawn Long Dyer</i>	Date: 6/15/18	Date: 6/15/18	Date: 6/15/18	Received By: <i>UPS</i>	Date: 6/15/18	Date: 6/15/18	Date: 6/15/18	Time: 1:53PM	Time: 1:53PM	Time: 1:53PM	Time: 1:53PM

AB5=Asbestos, PC=Pipe Opening
SO=Soil
SL=Sludge
CP=Clip Samples

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Login Sample Receipt Checklist

Client: Aptim Federal Services LLC

Job Number: 160-29039-2

Login Number: 29039**List Number: 1****Creator: Taylor, Kristene N****List Source: TestAmerica St. Louis**

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Definitions/Glossary

Client: Aptim Federal Services LLC
 Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29039-2

Qualifiers

Rad

Qualifier	Qualifier Description
U	Undetected at the Limit of Detection.

Glossary

Abbreviation **These commonly used abbreviations may or may not be present in this report.**

□	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Method Summary

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29039-2

Method	Method Description	Protocol	Laboratory
905.0	Total Beta Strontium (GFPC)	DOE	TAL SL
GA-01-R	Radium-226 & Other Gamma Emitters (GS)	DOE	TAL SL
DPS-0	Preparation, Digestion/ Precipitate	None	TAL SL
Dry and Grind	Preparation, Dry and Grind	None	TAL SL
Fill_Geo-21	Fill Geometry, 21-Day In-Growth	None	TAL SL

Protocol References:

DOE = U.S. Department of Energy

None = None

Laboratory References:

TAL SL = TestAmerica St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

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Sample Summary

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29039-2

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
160-29039-1	PE2-RSYD10-U8-S001	Solid	06/13/18 12:14	06/18/18 08:30
160-29039-2	PE2-RSYD10-U8-S002	Solid	06/13/18 12:18	06/18/18 08:30
160-29039-3	PE2-RSYD10-U8-S003	Solid	06/13/18 12:23	06/18/18 08:30
160-29039-4	PE2-RSYD10-U8-S004	Solid	06/13/18 12:27	06/18/18 08:30
160-29039-5	PE2-RSYD10-U8-S005	Solid	06/13/18 12:32	06/18/18 08:30
160-29039-6	PE2-RSYD10-U8-S006	Solid	06/13/18 12:37	06/18/18 08:30
160-29039-7	PE2-RSYD10-U8-S007	Solid	06/13/18 12:41	06/18/18 08:30
160-29039-8	PE2-RSYD10-U8-S008	Solid	06/13/18 12:46	06/18/18 08:30
160-29039-9	PE2-RSYD10-U8-S009	Solid	06/13/18 12:50	06/18/18 08:30
160-29039-10	PE2-RSYD10-U8-S010	Solid	06/13/18 12:55	06/18/18 08:30
160-29039-11	PE2-RSYD10-U8-S011	Solid	06/13/18 13:00	06/18/18 08:30
160-29039-12	PE2-RSYD10-U8-S012	Solid	06/13/18 13:05	06/18/18 08:30
160-29039-13	PE2-RSYD10-U8-S013	Solid	06/14/18 09:18	06/18/18 08:30
160-29039-14	PE2-RSYD10-U8-S014	Solid	06/14/18 09:21	06/18/18 08:30
160-29039-15	PE2-RSYD10-U8-S015	Solid	06/14/18 09:24	06/18/18 08:30
160-29039-16	PE2-RSYD10-U8-S016	Solid	06/14/18 09:27	06/18/18 08:30
160-29039-17	PE2-RSYD10-U8-S017	Solid	06/14/18 09:30	06/18/18 08:30
160-29039-18	PE2-RSYD10-U8-S018	Solid	06/14/18 09:33	06/18/18 08:30

Client Sample Results

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29039-2

Client Sample ID: PE2-RSYD10-U8-S001**Lab Sample ID: 160-29039-1**

Date Collected: 06/13/18 12:14

Matrix: Solid

Date Received: 06/18/18 08:30

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Total Beta Strontium	0.0212	U	0.0571	0.0571	0.331	0.0450	pCi/g	06/25/18 09:33	07/11/18 05:53	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Sr Carrier	88.6		40 - 110					06/25/18 09:33	07/11/18 05:53	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.672		0.272	0.281		0.104	pCi/g	06/21/18 18:35	07/12/18 17:30	1
Actinium-227	-0.297	U	1.08	1.08		0.874	pCi/g	06/21/18 18:35	07/12/18 17:30	1
Bismuth-212	0.529	U	0.931	0.932		0.718	pCi/g	06/21/18 18:35	07/12/18 17:30	1
Bismuth-214	0.586		0.170	0.180		0.0714	pCi/g	06/21/18 18:35	07/12/18 17:30	1
Cesium-137	-0.0353	U	0.0869	0.0870	0.0700	0.0688	pCi/g	06/21/18 18:35	07/12/18 17:30	1
Cobalt-60	0.0423		0.0733	0.0734	0.200	0.0328	pCi/g	06/21/18 18:35	07/12/18 17:30	1
Lead-210	1.05	U	1.80	1.80		1.25	pCi/g	06/21/18 18:35	07/12/18 17:30	1
Lead-212	0.614		0.122	0.138		0.0608	pCi/g	06/21/18 18:35	07/12/18 17:30	1
Lead-214	0.659		0.137	0.153		0.0848	pCi/g	06/21/18 18:35	07/12/18 17:30	1
Potassium-40	14.9		1.89	2.41		0.139	pCi/g	06/21/18 18:35	07/12/18 17:30	1
Protactinium-231	-0.393	U	3.39	3.39		2.78	pCi/g	06/21/18 18:35	07/12/18 17:30	1
Radium-226	0.586		0.170	0.180	0.700	0.0714	pCi/g	06/21/18 18:35	07/12/18 17:30	1
Radium-228	0.672		0.272	0.281		0.104	pCi/g	06/21/18 18:35	07/12/18 17:30	1
Thallium-208	0.314		0.0805	0.0866		0.0230	pCi/g	06/21/18 18:35	07/12/18 17:30	1
Thorium-228	0.614		0.122	0.138		0.0608	pCi/g	06/21/18 18:35	07/12/18 17:30	1
Thorium-232	0.672		0.272	0.281		0.104	pCi/g	06/21/18 18:35	07/12/18 17:30	1
Thorium-234	0.435	U	0.632	0.634		0.882	pCi/g	06/21/18 18:35	07/12/18 17:30	1
Uranium-235	-0.0407	U	0.0754	0.0756		0.629	pCi/g	06/21/18 18:35	07/12/18 17:30	1
Uranium-238	0.435	U	0.632	0.634		0.882	pCi/g	06/21/18 18:35	07/12/18 17:30	1

Client Sample ID: PE2-RSYD10-U8-S002**Lab Sample ID: 160-29039-2**

Date Collected: 06/13/18 12:18

Matrix: Solid

Date Received: 06/18/18 08:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.459		0.216	0.221		0.130	pCi/g	06/21/18 18:35	07/12/18 17:29	1
Actinium-227	-0.436	U	0.998	0.999		0.674	pCi/g	06/21/18 18:35	07/12/18 17:29	1
Bismuth-212	-0.626	U	1.25	1.25		0.982	pCi/g	06/21/18 18:35	07/12/18 17:29	1
Bismuth-214	0.748		0.168	0.185		0.0484	pCi/g	06/21/18 18:35	07/12/18 17:29	1
Cesium-137	-0.0624	U	0.108	0.108	0.0700	0.0843	pCi/g	06/21/18 18:35	07/12/18 17:29	1
Cobalt-60	-0.114	U	0.101	0.101	0.200	0.0940	pCi/g	06/21/18 18:35	07/12/18 17:29	1
Lead-210	-0.273	U	2.02	2.02		1.43	pCi/g	06/21/18 18:35	07/12/18 17:29	1
Lead-212	0.457		0.139	0.151		0.0891	pCi/g	06/21/18 18:35	07/12/18 17:29	1
Lead-214	0.764		0.146	0.166		0.0718	pCi/g	06/21/18 18:35	07/12/18 17:29	1
Potassium-40	11.6		1.87	2.21		0.310	pCi/g	06/21/18 18:35	07/12/18 17:29	1
Protactinium-231	0.557	U	2.48	2.48		2.63	pCi/g	06/21/18 18:35	07/12/18 17:29	1

Client Sample Results

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29039-2

Client Sample ID: PE2-RSYD10-U8-S002

Date Collected: 06/13/18 12:18

Date Received: 06/18/18 08:30

Lab Sample ID: 160-29039-2

Matrix: Solid

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Radium-226	0.748		0.168	0.185	0.700	0.0484	pCi/g	06/21/18 18:35	07/12/18 17:29	1
Radium-228	0.459		0.216	0.221		0.130	pCi/g	06/21/18 18:35	07/12/18 17:29	1
Thallium-208	0.223		0.0802	0.0835		0.0321	pCi/g	06/21/18 18:35	07/12/18 17:29	1
Thorium-228	0.457		0.139	0.151		0.0891	pCi/g	06/21/18 18:35	07/12/18 17:29	1
Thorium-232	0.459		0.216	0.221		0.130	pCi/g	06/21/18 18:35	07/12/18 17:29	1
Thorium-234	1.23		1.24	1.25		0.823	pCi/g	06/21/18 18:35	07/12/18 17:29	1
Uranium-235	0.181	U	0.380	0.380		0.344	pCi/g	06/21/18 18:35	07/12/18 17:29	1
Uranium-238	1.23		1.24	1.25		0.823	pCi/g	06/21/18 18:35	07/12/18 17:29	1

Client Sample ID: PE2-RSYD10-U8-S003

Date Collected: 06/13/18 12:23

Date Received: 06/18/18 08:30

Lab Sample ID: 160-29039-3

Matrix: Solid

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.538		0.241	0.247		0.140	pCi/g	06/21/18 18:35	07/12/18 17:31	1
Actinium-227	-0.481	U	1.23	1.23		0.996	pCi/g	06/21/18 18:35	07/12/18 17:31	1
Bismuth-212	0.561	U	0.990	0.992		0.756	pCi/g	06/21/18 18:35	07/12/18 17:31	1
Bismuth-214	0.182	U	0.101	0.102		0.265	pCi/g	06/21/18 18:35	07/12/18 17:31	1
Cesium-137	0.0318	U	0.0826	0.0827	0.0700	0.0648	pCi/g	06/21/18 18:35	07/12/18 17:31	1
Cobalt-60	0.0457		0.0412	0.0414	0.200	0.0171	pCi/g	06/21/18 18:35	07/12/18 17:31	1
Lead-210	2.29		1.90	1.92		1.24	pCi/g	06/21/18 18:35	07/12/18 17:31	1
Lead-212	0.553		0.129	0.141		0.0655	pCi/g	06/21/18 18:35	07/12/18 17:31	1
Lead-214	0.867		0.170	0.192		0.0437	pCi/g	06/21/18 18:35	07/12/18 17:31	1
Potassium-40	10.4		2.05	2.31		0.599	pCi/g	06/21/18 18:35	07/12/18 17:31	1
Protactinium-231	0.000	U	0.957	0.957		3.06	pCi/g	06/21/18 18:35	07/12/18 17:31	1
Radium-226	0.182	U	0.101	0.102	0.700	0.265	pCi/g	06/21/18 18:35	07/12/18 17:31	1
Radium-228	0.538		0.241	0.247		0.140	pCi/g	06/21/18 18:35	07/12/18 17:31	1
Thallium-208	0.280		0.0895	0.0939		0.0324	pCi/g	06/21/18 18:35	07/12/18 17:31	1
Thorium-228	0.553		0.129	0.141		0.0655	pCi/g	06/21/18 18:35	07/12/18 17:31	1
Thorium-232	0.538		0.241	0.247		0.140	pCi/g	06/21/18 18:35	07/12/18 17:31	1
Thorium-234	0.400	U	0.404	0.407		1.64	pCi/g	06/21/18 18:35	07/12/18 17:31	1
Uranium-235	0.0296	U	0.192	0.192		0.568	pCi/g	06/21/18 18:35	07/12/18 17:31	1
Uranium-238	0.400	U	0.404	0.407		1.64	pCi/g	06/21/18 18:35	07/12/18 17:31	1

Client Sample ID: PE2-RSYD10-U8-S004

Date Collected: 06/13/18 12:27

Date Received: 06/18/18 08:30

Lab Sample ID: 160-29039-4

Matrix: Solid

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.449		0.204	0.209		0.126	pCi/g	06/21/18 18:35	07/12/18 17:30	1
Actinium-227	0.591		0.631	0.634		0.402	pCi/g	06/21/18 18:35	07/12/18 17:30	1
Bismuth-212	0.0636	U	0.888	0.888		0.726	pCi/g	06/21/18 18:35	07/12/18 17:30	1

Client Sample Results

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29039-2

Client Sample ID: PE2-RSYD10-U8-S004**Lab Sample ID: 160-29039-4**

Date Collected: 06/13/18 12:27

Matrix: Solid

Date Received: 06/18/18 08:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Bismuth-214	0.551		0.180	0.189		0.0703	pCi/g	06/21/18 18:35	07/12/18 17:30	1
Cesium-137	0.0258	U	0.0540	0.0541	0.0700	0.0413	pCi/g	06/21/18 18:35	07/12/18 17:30	1
Cobalt-60	-0.0767	U	0.109	0.109	0.200	0.0619	pCi/g	06/21/18 18:35	07/12/18 17:30	1
Lead-210	1.18		1.49	1.49		1.02	pCi/g	06/21/18 18:35	07/12/18 17:30	1
Lead-212	0.525		0.119	0.137		0.0646	pCi/g	06/21/18 18:35	07/12/18 17:30	1
Lead-214	0.567		0.150	0.161		0.0598	pCi/g	06/21/18 18:35	07/12/18 17:30	1
Potassium-40	9.57		1.54	1.83		0.344	pCi/g	06/21/18 18:35	07/12/18 17:30	1
Protactinium-231	-0.875	U	3.14	3.14		2.56	pCi/g	06/21/18 18:35	07/12/18 17:30	1
Radium-226	0.551		0.180	0.189	0.700	0.0703	pCi/g	06/21/18 18:35	07/12/18 17:30	1
Radium-228	0.449		0.204	0.209		0.126	pCi/g	06/21/18 18:35	07/12/18 17:30	1
Thallium-208	0.154		0.0605	0.0626		0.0259	pCi/g	06/21/18 18:35	07/12/18 17:30	1
Thorium-228	0.525		0.119	0.137		0.0646	pCi/g	06/21/18 18:35	07/12/18 17:30	1
Thorium-232	0.449		0.204	0.209		0.126	pCi/g	06/21/18 18:35	07/12/18 17:30	1
Thorium-234	0.851		1.07	1.08		0.820	pCi/g	06/21/18 18:35	07/12/18 17:30	1
Uranium-235	0.249		0.230	0.232		0.138	pCi/g	06/21/18 18:35	07/12/18 17:30	1
Uranium-238	0.851		1.07	1.08		0.820	pCi/g	06/21/18 18:35	07/12/18 17:30	1

Client Sample ID: PE2-RSYD10-U8-S005**Lab Sample ID: 160-29039-5**

Date Collected: 06/13/18 12:32

Matrix: Solid

Date Received: 06/18/18 08:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.875		0.248	0.264		0.0521	pCi/g	06/21/18 18:35	07/12/18 18:18	1
Actinium-227	0.0199	U	0.207	0.207		0.592	pCi/g	06/21/18 18:35	07/12/18 18:18	1
Bismuth-212	0.000	U	0.349	0.349		0.778	pCi/g	06/21/18 18:35	07/12/18 18:18	1
Lead-214	0.945		0.215	0.236		0.0468	pCi/g	06/21/18 18:35	07/12/18 18:18	1
Cesium-137	-0.0218	U	0.107	0.107	0.0700	0.0898	pCi/g	06/21/18 18:35	07/12/18 18:18	1
Cobalt-60	-0.0181	U	0.172	0.172	0.200	0.0691	pCi/g	06/21/18 18:35	07/12/18 18:18	1
Lead-210	1.76		1.45	1.46		0.917	pCi/g	06/21/18 18:35	07/12/18 18:18	1
Lead-212	0.620		0.157	0.176		0.0728	pCi/g	06/21/18 18:35	07/12/18 18:18	1
Lead-214	0.0646	U	0.215	0.215		0.202	pCi/g	06/21/18 18:35	07/12/18 18:18	1
Potassium-40	13.4		2.20	2.59		0.211	pCi/g	06/21/18 18:35	07/12/18 18:18	1
Protactinium-231	0.521	U	1.84	1.84		2.91	pCi/g	06/21/18 18:35	07/12/18 18:18	1
Radium-226	0.945		0.215	0.236	0.700	0.0468	pCi/g	06/21/18 18:35	07/12/18 18:18	1
Radium-228	0.875		0.248	0.264		0.0521	pCi/g	06/21/18 18:35	07/12/18 18:18	1
Thallium-208	0.159		0.0830	0.0846		0.0388	pCi/g	06/21/18 18:35	07/12/18 18:18	1
Thorium-228	0.620		0.157	0.176		0.0728	pCi/g	06/21/18 18:35	07/12/18 18:18	1
Thorium-232	0.875		0.248	0.264		0.0521	pCi/g	06/21/18 18:35	07/12/18 18:18	1
Thorium-234	-0.301	U	1.78	1.78		1.47	pCi/g	06/21/18 18:35	07/12/18 18:18	1
Uranium-235	0.309		0.206	0.208		0.111	pCi/g	06/21/18 18:35	07/12/18 18:18	1
Uranium-238	-0.301	U	1.78	1.78		1.47	pCi/g	06/21/18 18:35	07/12/18 18:18	1

Client Sample Results

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29039-2

Client Sample ID: PE2-RSYD10-U8-S006

Date Collected: 06/13/18 12:37

Date Received: 06/18/18 08:30

Lab Sample ID: 160-29039-6

Matrix: Solid

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac	
			(2σ+/-)	(2σ+/-)							
Actinium 228	0.863		0.251	0.266		0.106	pCi/g	06/21/18 18:35	07/12/18 18:17	1	
Actinium-227	-0.366	U		1.04	1.05	0.671	pCi/g	06/21/18 18:35	07/12/18 18:17	1	
Bismuth-212	1.49		0.574	0.594		0.129	pCi/g	06/21/18 18:35	07/12/18 18:17	1	
Bismuth-214	0.868		0.181	0.201		0.0539	pCi/g	06/21/18 18:35	07/12/18 18:17	1	
Cesium-137	-0.0305	U	0.0896	0.0896	0.0700	0.0712	pCi/g	06/21/18 18:35	07/12/18 18:17	1	
Cobalt-60	0.0651		0.0412	0.0417	0.200	0.0152	pCi/g	06/21/18 18:35	07/12/18 18:17	1	
Lead-210	0.00143	U		2.31	2.31		1.89	pCi/g	06/21/18 18:35	07/12/18 18:17	1
Lead-212	0.893		0.145	0.173		0.0639	pCi/g	06/21/18 18:35	07/12/18 18:17	1	
Lead-214	0.714		0.155	0.171		0.0852	pCi/g	06/21/18 18:35	07/12/18 18:17	1	
Potassium-40	12.9		1.84	2.25		0.153	pCi/g	06/21/18 18:35	07/12/18 18:17	1	
Protactinium-231	0.000	U	0.150	0.150		3.08	pCi/g	06/21/18 18:35	07/12/18 18:17	1	
Radium-226	0.868		0.181	0.201	0.700	0.0539	pCi/g	06/21/18 18:35	07/12/18 18:17	1	
Radium-228	0.863		0.251	0.266		0.106	pCi/g	06/21/18 18:35	07/12/18 18:17	1	
Thallium-208	0.351		0.105	0.111		0.0360	pCi/g	06/21/18 18:35	07/12/18 18:17	1	
Thorium-228	0.893		0.145	0.173		0.0639	pCi/g	06/21/18 18:35	07/12/18 18:17	1	
Thorium-232	0.863		0.251	0.266		0.106	pCi/g	06/21/18 18:35	07/12/18 18:17	1	
Thorium-234	0.588	U		0.616	0.619		0.988	pCi/g	06/21/18 18:35	07/12/18 18:17	1
Uranium-235	-0.0339	U	0.0676	0.0677		0.721	pCi/g	06/21/18 18:35	07/12/18 18:17	1	
Uranium-238	0.588	U		0.616	0.619		0.988	pCi/g	06/21/18 18:35	07/12/18 18:17	1

Client Sample ID: PE2-RSYD10-U8-S007

Date Collected: 06/13/18 12:41

Date Received: 06/18/18 08:30

Lab Sample ID: 160-29039-7

Matrix: Solid

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.767		0.199	0.214		0.0356	pCi/g	06/21/18 18:35	07/12/18 18:17	1
Actinium-227	0.184	U		0.722	0.722	0.492	pCi/g	06/21/18 18:35	07/12/18 18:17	1
Bismuth-212	1.67		0.710	0.731		0.223	pCi/g	06/21/18 18:35	07/12/18 18:17	1
Bismuth-214	0.719		0.163	0.179		0.0523	pCi/g	06/21/18 18:35	07/12/18 18:17	1
Cesium-137	0.0325	U	0.0605	0.0606	0.0700	0.0461	pCi/g	06/21/18 18:35	07/12/18 18:17	1
Cobalt-60	0.00316	U	0.00414	0.00415	0.200	0.0462	pCi/g	06/21/18 18:35	07/12/18 18:17	1
Lead-210	0.949		1.42	1.42		0.946	pCi/g	06/21/18 18:35	07/12/18 18:17	1
Lead-212	0.634		0.121	0.147		0.0622	pCi/g	06/21/18 18:35	07/12/18 18:17	1
Lead-214	0.823		0.176	0.195		0.0638	pCi/g	06/21/18 18:35	07/12/18 18:17	1
Potassium-40	14.7		1.93	2.45		0.263	pCi/g	06/21/18 18:35	07/12/18 18:17	1
Protactinium-231	-0.838	U		3.12	3.12	2.54	pCi/g	06/21/18 18:35	07/12/18 18:17	1
Radium-226	0.719		0.163	0.179	0.700	0.0523	pCi/g	06/21/18 18:35	07/12/18 18:17	1
Radium-228	0.767		0.199	0.214		0.0356	pCi/g	06/21/18 18:35	07/12/18 18:17	1
Thallium-208	0.314		0.0763	0.0830		0.0230	pCi/g	06/21/18 18:35	07/12/18 18:17	1
Thorium-228	0.634		0.121	0.147		0.0622	pCi/g	06/21/18 18:35	07/12/18 18:17	1
Thorium-232	0.767		0.199	0.214		0.0356	pCi/g	06/21/18 18:35	07/12/18 18:17	1
Thorium-234	0.164	U		1.36	1.36	1.11	pCi/g	06/21/18 18:35	07/12/18 18:17	1
Uranium-235	0.0971	U		0.431	0.431	0.351	pCi/g	06/21/18 18:35	07/12/18 18:17	1
Uranium-238	0.164	U		1.36	1.36	1.11	pCi/g	06/21/18 18:35	07/12/18 18:17	1

Client Sample Results

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29039-2

Client Sample ID: PE2-RSYD10-U8-S008

Date Collected: 06/13/18 12:46

Date Received: 06/18/18 08:30

Lab Sample ID: 160-29039-8

Matrix: Solid

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.0490	U	0.0613	0.0615		0.303	pCi/g	06/21/18 18:35	07/12/18 18:18	1
Actinium-227	0.0232	U	0.270	0.270		0.516	pCi/g	06/21/18 18:35	07/12/18 18:18	1
Bismuth-212	0.441	U	0.937	0.938		0.736	pCi/g	06/21/18 18:35	07/12/18 18:18	1
Bismuth-214	0.689		0.168	0.183		0.0618	pCi/g	06/21/18 18:35	07/12/18 18:18	1
Cesium-137	-0.0295	U	0.0775	0.0775	0.0700	0.0614	pCi/g	06/21/18 18:35	07/12/18 18:18	1
Cobalt-60	0.0111	U	0.0832	0.0832	0.200	0.0422	pCi/g	06/21/18 18:35	07/12/18 18:18	1
Lead-210	0.218	U	1.40	1.40		1.03	pCi/g	06/21/18 18:35	07/12/18 18:18	1
Lead-212	0.647		0.123	0.149		0.0626	pCi/g	06/21/18 18:35	07/12/18 18:18	1
Lead-214	0.605		0.144	0.157		0.0593	pCi/g	06/21/18 18:35	07/12/18 18:18	1
Potassium-40	14.1		1.81	2.31		0.329	pCi/g	06/21/18 18:35	07/12/18 18:18	1
Protactinium-231	0.588	U	2.01	2.02		2.20	pCi/g	06/21/18 18:35	07/12/18 18:18	1
Radium-226	0.689		0.168	0.183	0.700	0.0618	pCi/g	06/21/18 18:35	07/12/18 18:18	1
Radium-228	0.0490	U	0.0613	0.0615		0.303	pCi/g	06/21/18 18:35	07/12/18 18:18	1
Thallium-208	0.200		0.0851	0.0876		0.0385	pCi/g	06/21/18 18:35	07/12/18 18:18	1
Thorium-228	0.647		0.123	0.149		0.0626	pCi/g	06/21/18 18:35	07/12/18 18:18	1
Thorium-232	0.0490	U	0.0613	0.0615		0.303	pCi/g	06/21/18 18:35	07/12/18 18:18	1
Thorium-234	1.23		1.08	1.09		0.806	pCi/g	06/21/18 18:35	07/12/18 18:18	1
Uranium-235	-0.192	U	0.521	0.521		0.423	pCi/g	06/21/18 18:35	07/12/18 18:18	1
Uranium-238	1.23		1.08	1.09		0.806	pCi/g	06/21/18 18:35	07/12/18 18:18	1

Client Sample ID: PE2-RSYD10-U8-S009

Date Collected: 06/13/18 12:50

Date Received: 06/18/18 08:30

Lab Sample ID: 160-29039-9

Matrix: Solid

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.422		0.224	0.228		0.0862	pCi/g	06/21/18 18:35	07/12/18 18:18	1
Actinium-227	-0.420	U	1.10	1.11		0.894	pCi/g	06/21/18 18:35	07/12/18 18:18	1
Bismuth-212	-0.359	U	0.998	0.999		0.790	pCi/g	06/21/18 18:35	07/12/18 18:18	1
Bismuth-214	0.373		0.129	0.134		0.0502	pCi/g	06/21/18 18:35	07/12/18 18:18	1
Cesium-137	0.00548	U	0.0769	0.0769	0.0700	0.0628	pCi/g	06/21/18 18:35	07/12/18 18:18	1
Cobalt-60	-0.0220	U	0.0863	0.0863	0.200	0.0379	pCi/g	06/21/18 18:35	07/12/18 18:18	1
Lead-210	2.23		1.76	1.79		1.13	pCi/g	06/21/18 18:35	07/12/18 18:18	1
Lead-212	0.325		0.102	0.107		0.0583	pCi/g	06/21/18 18:35	07/12/18 18:18	1
Lead-214	0.597		0.138	0.151		0.0499	pCi/g	06/21/18 18:35	07/12/18 18:18	1
Potassium-40	13.4		1.92	2.34		0.380	pCi/g	06/21/18 18:35	07/12/18 18:18	1
Protactinium-231	0.000	U	0.351	0.351		2.69	pCi/g	06/21/18 18:35	07/12/18 18:18	1
Radium-226	0.373		0.129	0.134	0.700	0.0502	pCi/g	06/21/18 18:35	07/12/18 18:18	1
Radium-228	0.422		0.224	0.228		0.0862	pCi/g	06/21/18 18:35	07/12/18 18:18	1
Thallium-208	0.0926		0.109	0.109		0.0530	pCi/g	06/21/18 18:35	07/12/18 18:18	1
Thorium-228	0.325		0.102	0.107		0.0583	pCi/g	06/21/18 18:35	07/12/18 18:18	1
Thorium-232	0.422		0.224	0.228		0.0862	pCi/g	06/21/18 18:35	07/12/18 18:18	1
Thorium-234	-0.251	U	1.40	1.40		1.16	pCi/g	06/21/18 18:35	07/12/18 18:18	1
Uranium-235	-0.217	U	0.448	0.449		0.492	pCi/g	06/21/18 18:35	07/12/18 18:18	1
Uranium-238	-0.251	U	1.40	1.40		1.16	pCi/g	06/21/18 18:35	07/12/18 18:18	1

Client Sample Results

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29039-2

Client Sample ID: PE2-RSYD10-U8-S010**Lab Sample ID: 160-29039-10**

Matrix: Solid

Date Collected: 06/13/18 12:55

Date Received: 06/18/18 08:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac	
			(2σ+/-)	(2σ+/-)							
Actinium 228	0.728		0.246	0.257		0.0485	pCi/g	06/21/18 18:35	07/12/18 18:56	1	
Actinium-227	-0.576	U		1.42	1.43		1.15	pCi/g	06/21/18 18:35	07/12/18 18:56	1
Bismuth-212	1.62		0.663	0.683		0.158	pCi/g	06/21/18 18:35	07/12/18 18:56	1	
Bismuth-214	0.538		0.176	0.184		0.0638	pCi/g	06/21/18 18:35	07/12/18 18:56	1	
Cesium-137	0.0491	U	0.0900	0.0901	0.0700	0.0689	pCi/g	06/21/18 18:35	07/12/18 18:56	1	
Cobalt-60	0.0287	U	0.0971	0.0972	0.200	0.0476	pCi/g	06/21/18 18:35	07/12/18 18:56	1	
Lead-210	1.10	U		2.88	2.88		1.78	pCi/g	06/21/18 18:35	07/12/18 18:56	1
Lead-212	0.663		0.146	0.162		0.0733	pCi/g	06/21/18 18:35	07/12/18 18:56	1	
Lead-214	0.673		0.164	0.178		0.0490	pCi/g	06/21/18 18:35	07/12/18 18:56	1	
Potassium-40	12.7		2.12	2.48		0.478	pCi/g	06/21/18 18:35	07/12/18 18:56	1	
Protactinium-231	0.000	U	0.844	0.844		3.48	pCi/g	06/21/18 18:35	07/12/18 18:56	1	
Radium-226	0.538		0.176	0.184	0.700	0.0638	pCi/g	06/21/18 18:35	07/12/18 18:56	1	
Radium-228	0.728		0.246	0.257		0.0485	pCi/g	06/21/18 18:35	07/12/18 18:56	1	
Thallium-208	0.178		0.139	0.140		0.0619	pCi/g	06/21/18 18:35	07/12/18 18:56	1	
Thorium-228	0.663		0.146	0.162		0.0733	pCi/g	06/21/18 18:35	07/12/18 18:56	1	
Thorium-232	0.728		0.246	0.257		0.0485	pCi/g	06/21/18 18:35	07/12/18 18:56	1	
Thorium-234	-0.108	U		2.35	2.35		1.93	pCi/g	06/21/18 18:35	07/12/18 18:56	1
Uranium-235	0.0524	U	0.326	0.326		0.717	pCi/g	06/21/18 18:35	07/12/18 18:56	1	
Uranium-238	-0.108	U		2.35	2.35		1.93	pCi/g	06/21/18 18:35	07/12/18 18:56	1

Client Sample ID: PE2-RSYD10-U8-S011**Lab Sample ID: 160-29039-11**

Matrix: Solid

Date Collected: 06/13/18 13:00

Date Received: 06/18/18 08:30

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Total Beta Strontium	-0.0297	U	0.0529	0.0529	0.331	0.0463	pCi/g	06/25/18 09:33	07/11/18 05:54	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Sr Carrier	90.7		40 - 110					06/25/18 09:33	07/11/18 05:54	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.393		0.305	0.308		0.170	pCi/g	06/21/18 18:35	07/12/18 18:59	1
Actinium-227	0.139	U	0.419	0.419		0.515	pCi/g	06/21/18 18:35	07/12/18 18:59	1
Bismuth-212	0.0779	U	1.30	1.30		1.06	pCi/g	06/21/18 18:35	07/12/18 18:59	1
Bismuth-214	0.674		0.164	0.178		0.0343	pCi/g	06/21/18 18:35	07/12/18 18:59	1
Cesium-137	0.00300	U	0.0889	0.0889	0.0700	0.0725	pCi/g	06/21/18 18:35	07/12/18 18:59	1
Cobalt-60	-0.0649	U	0.120	0.120	0.200	0.0732	pCi/g	06/21/18 18:35	07/12/18 18:59	1
Lead-210	1.00		1.49	1.49		0.949	pCi/g	06/21/18 18:35	07/12/18 18:59	1
Lead-212	0.510		0.112	0.130		0.0510	pCi/g	06/21/18 18:35	07/12/18 18:59	1
Lead-214	0.769		0.169	0.187		0.0606	pCi/g	06/21/18 18:35	07/12/18 18:59	1
Potassium-40	9.12		2.22	2.41		0.733	pCi/g	06/21/18 18:35	07/12/18 18:59	1
Protactinium-231	-0.705	U	3.35	3.35		2.73	pCi/g	06/21/18 18:35	07/12/18 18:59	1

Client Sample Results

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29039-2

Client Sample ID: PE2-RSYD10-U8-S011**Lab Sample ID: 160-29039-11**

Date Collected: 06/13/18 13:00

Matrix: Solid

Date Received: 06/18/18 08:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Radium-226	0.674		0.164	0.178	0.700	0.0343	pCi/g	06/21/18 18:35	07/12/18 18:59	1
Radium-228	0.393		0.305	0.308		0.170	pCi/g	06/21/18 18:35	07/12/18 18:59	1
Thallium-208	0.269		0.0735	0.0786		0.0168	pCi/g	06/21/18 18:35	07/12/18 18:59	1
Thorium-228	0.510		0.112	0.130		0.0510	pCi/g	06/21/18 18:35	07/12/18 18:59	1
Thorium-232	0.393		0.305	0.308		0.170	pCi/g	06/21/18 18:35	07/12/18 18:59	1
Thorium-234	0.0389	U		1.44		1.18	pCi/g	06/21/18 18:35	07/12/18 18:59	1
Uranium-235	0.160	U	0.374	0.374		0.313	pCi/g	06/21/18 18:35	07/12/18 18:59	1
Uranium-238	0.0389	U		1.44		1.18	pCi/g	06/21/18 18:35	07/12/18 18:59	1

Client Sample ID: PE2-RSYD10-U8-S012**Lab Sample ID: 160-29039-12**

Date Collected: 06/13/18 13:05

Matrix: Solid

Date Received: 06/18/18 08:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac	
			(2σ+/-)	(2σ+/-)							
Actinium 228	0.997		0.290	0.307		0.0863	pCi/g	06/21/18 18:35	07/12/18 19:27	1	
Actinium-227	-0.0754	U		1.08		0.888	pCi/g	06/21/18 18:35	07/12/18 19:27	1	
Bismuth-212	0.448	U		1.09		0.858	pCi/g	06/21/18 18:35	07/12/18 19:27	1	
Bismuth-214	0.809		0.223	0.238		0.0725	pCi/g	06/21/18 18:35	07/12/18 19:27	1	
Cesium-137	0.000	U	0.0645	0.0645	0.0700	0.0696	pCi/g	06/21/18 18:35	07/12/18 19:27	1	
Cobalt-60	-0.0271	U		0.151	0.151	0.0704	pCi/g	06/21/18 18:35	07/12/18 19:27	1	
Lead-210	1.88			2.19		1.45	pCi/g	06/21/18 18:35	07/12/18 19:27	1	
Lead-212	0.687			0.143		0.0747	pCi/g	06/21/18 18:35	07/12/18 19:27	1	
Lead-214	0.616			0.184		0.0790	pCi/g	06/21/18 18:35	07/12/18 19:27	1	
Potassium-40	9.99			2.12		0.709	pCi/g	06/21/18 18:35	07/12/18 19:27	1	
Protactinium-231	0.000	U		0.507	0.507		3.38	pCi/g	06/21/18 18:35	07/12/18 19:27	1
Radium-226	0.809		0.223	0.238	0.700	0.0725	pCi/g	06/21/18 18:35	07/12/18 19:27	1	
Radium-228	0.997			0.290	0.307		0.0863	pCi/g	06/21/18 18:35	07/12/18 19:27	1
Thallium-208	0.274		0.0950	0.0990		0.0393	pCi/g	06/21/18 18:35	07/12/18 19:27	1	
Thorium-228	0.687			0.143	0.160		0.0747	pCi/g	06/21/18 18:35	07/12/18 19:27	1
Thorium-232	0.997		0.290	0.307		0.0863	pCi/g	06/21/18 18:35	07/12/18 19:27	1	
Thorium-234	-0.930	U		1.64	1.64		1.86	pCi/g	06/21/18 18:35	07/12/18 19:27	1
Uranium-235	0.140	U		0.291	0.291		0.322	pCi/g	06/21/18 18:35	07/12/18 19:27	1
Uranium-238	-0.930	U		1.64	1.64		1.86	pCi/g	06/21/18 18:35	07/12/18 19:27	1

Client Sample ID: PE2-RSYD10-U8-S013**Lab Sample ID: 160-29039-13**

Date Collected: 06/14/18 09:18

Matrix: Solid

Date Received: 06/18/18 08:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac	
			(2σ+/-)	(2σ+/-)							
Actinium 228	0.935		0.354	0.366		0.183	pCi/g	06/21/18 18:35	07/12/18 19:31	1	
Actinium-227	-0.423	U		0.927	0.928		0.623	pCi/g	06/21/18 18:35	07/12/18 19:31	1
Bismuth-212	0.736	U		1.42	1.42		1.11	pCi/g	06/21/18 18:35	07/12/18 19:31	1

Client Sample Results

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29039-2

Client Sample ID: PE2-RSYD10-U8-S013**Lab Sample ID: 160-29039-13**

Date Collected: 06/14/18 09:18

Matrix: Solid

Date Received: 06/18/18 08:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Bismuth-214	0.918		0.200	0.222		0.0411	pCi/g	06/21/18 18:35	07/12/18 19:31	1
Cesium-137	0.0187	U	0.112	0.112	0.0700	0.0901	pCi/g	06/21/18 18:35	07/12/18 19:31	1
Cobalt-60	0.0277	U	0.0942	0.0942	0.200	0.0465	pCi/g	06/21/18 18:35	07/12/18 19:31	1
Lead-210	-0.115	U	1.96	1.96		1.39	pCi/g	06/21/18 18:35	07/12/18 19:31	1
Lead-212	0.770		0.131	0.164		0.0433	pCi/g	06/21/18 18:35	07/12/18 19:31	1
Lead-214	0.806		0.171	0.191		0.0503	pCi/g	06/21/18 18:35	07/12/18 19:31	1
Potassium-40	13.6		2.15	2.56		0.198	pCi/g	06/21/18 18:35	07/12/18 19:31	1
Protactinium-231	0.000	U	0.922	0.922		2.91	pCi/g	06/21/18 18:35	07/12/18 19:31	1
Radium-226	0.918		0.200	0.222	0.700	0.0411	pCi/g	06/21/18 18:35	07/12/18 19:31	1
Radium-228	0.935		0.354	0.366		0.183	pCi/g	06/21/18 18:35	07/12/18 19:31	1
Thallium-208	0.234		0.0824	0.0859		0.0277	pCi/g	06/21/18 18:35	07/12/18 19:31	1
Thorium-228	0.770		0.131	0.164		0.0433	pCi/g	06/21/18 18:35	07/12/18 19:31	1
Thorium-232	0.935		0.354	0.366		0.183	pCi/g	06/21/18 18:35	07/12/18 19:31	1
Thorium-234	1.19		1.26	1.26		0.958	pCi/g	06/21/18 18:35	07/12/18 19:31	1
Uranium-235	0.141	U	0.291	0.291		0.414	pCi/g	06/21/18 18:35	07/12/18 19:31	1
Uranium-238	1.19		1.26	1.26		0.958	pCi/g	06/21/18 18:35	07/12/18 19:31	1

Client Sample ID: PE2-RSYD10-U8-S014**Lab Sample ID: 160-29039-14**

Date Collected: 06/14/18 09:21

Matrix: Solid

Date Received: 06/18/18 08:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.938		0.273	0.289		0.127	pCi/g	06/21/18 18:35	07/12/18 19:59	1
Actinium-227	-0.491	U	1.25	1.25		1.01	pCi/g	06/21/18 18:35	07/12/18 19:59	1
Bismuth-212	0.000	U	0.774	0.774		0.823	pCi/g	06/21/18 18:35	07/12/18 19:59	1
Bismuth-214	0.197	U	0.0927	0.0948		0.246	pCi/g	06/21/18 18:35	07/12/18 19:59	1
Cesium-137	0.0154	U	0.0797	0.0797	0.0700	0.0642	pCi/g	06/21/18 18:35	07/12/18 19:59	1
Cobalt-60	0.0242	U	0.0649	0.0649	0.200	0.0393	pCi/g	06/21/18 18:35	07/12/18 19:59	1
Lead-210	1.66		2.15	2.16		1.36	pCi/g	06/21/18 18:35	07/12/18 19:59	1
Lead-212	0.703		0.129	0.149		0.0584	pCi/g	06/21/18 18:35	07/12/18 19:59	1
Lead-214	0.637		0.166	0.178		0.0645	pCi/g	06/21/18 18:35	07/12/18 19:59	1
Potassium-40	13.6		1.97	2.40		0.394	pCi/g	06/21/18 18:35	07/12/18 19:59	1
Protactinium-231	0.000	U	0.364	0.364		3.07	pCi/g	06/21/18 18:35	07/12/18 19:59	1
Radium-226	0.197	U	0.0927	0.0948	0.700	0.246	pCi/g	06/21/18 18:35	07/12/18 19:59	1
Radium-228	0.938		0.273	0.289		0.127	pCi/g	06/21/18 18:35	07/12/18 19:59	1
Thallium-208	0.309		0.104	0.109		0.0392	pCi/g	06/21/18 18:35	07/12/18 19:59	1
Thorium-228	0.703		0.129	0.149		0.0584	pCi/g	06/21/18 18:35	07/12/18 19:59	1
Thorium-232	0.938		0.273	0.289		0.127	pCi/g	06/21/18 18:35	07/12/18 19:59	1
Thorium-234	-0.862	U	1.59	1.59		1.72	pCi/g	06/21/18 18:35	07/12/18 19:59	1
Uranium-235	-0.313	U	0.450	0.451		0.731	pCi/g	06/21/18 18:35	07/12/18 19:59	1
Uranium-238	-0.862	U	1.59	1.59		1.72	pCi/g	06/21/18 18:35	07/12/18 19:59	1

Client Sample Results

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29039-2

Client Sample ID: PE2-RSYD10-U8-S015**Lab Sample ID: 160-29039-15**

Date Collected: 06/14/18 09:24

Matrix: Solid

Date Received: 06/18/18 08:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.632		0.282	0.289		0.106	pCi/g	06/21/18 18:35	07/12/18 20:04	1
Actinium-227	0.314	U	0.312	0.314		0.546	pCi/g	06/21/18 18:35	07/12/18 20:04	1
Bismuth-212	0.000	U	0.869	0.869		0.924	pCi/g	06/21/18 18:35	07/12/18 20:04	1
Bismuth-214	0.806		0.193	0.210		0.0432	pCi/g	06/21/18 18:35	07/12/18 20:04	1
Cesium-137	-0.0688	U	0.105	0.105	0.0700	0.116	pCi/g	06/21/18 18:35	07/12/18 20:04	1
Cobalt-60	-0.0198	U	0.204	0.204	0.200	0.0793	pCi/g	06/21/18 18:35	07/12/18 20:04	1
Lead-210	1.47		1.63	1.64		1.00	pCi/g	06/21/18 18:35	07/12/18 20:04	1
Lead-212	0.676		0.133	0.159		0.0586	pCi/g	06/21/18 18:35	07/12/18 20:04	1
Lead-214	0.671		0.176	0.189		0.0860	pCi/g	06/21/18 18:35	07/12/18 20:04	1
Potassium-40	12.4		2.06	2.42		0.199	pCi/g	06/21/18 18:35	07/12/18 20:04	1
Protactinium-231	0.336	U	3.18	3.18		2.61	pCi/g	06/21/18 18:35	07/12/18 20:04	1
Radium-226	0.806		0.193	0.210	0.700	0.0432	pCi/g	06/21/18 18:35	07/12/18 20:04	1
Radium-228	0.632		0.282	0.289		0.106	pCi/g	06/21/18 18:35	07/12/18 20:04	1
Thallium-208	0.267		0.0877	0.0920		0.0291	pCi/g	06/21/18 18:35	07/12/18 20:04	1
Thorium-228	0.676		0.133	0.159		0.0586	pCi/g	06/21/18 18:35	07/12/18 20:04	1
Thorium-232	0.632		0.282	0.289		0.106	pCi/g	06/21/18 18:35	07/12/18 20:04	1
Thorium-234	0.839		1.18	1.19		0.799	pCi/g	06/21/18 18:35	07/12/18 20:04	1
Uranium-235	0.180	U	0.365	0.366		0.320	pCi/g	06/21/18 18:35	07/12/18 20:04	1
Uranium-238	0.839		1.18	1.19		0.799	pCi/g	06/21/18 18:35	07/12/18 20:04	1

Client Sample ID: PE2-RSYD10-U8-S016**Lab Sample ID: 160-29039-16**

Date Collected: 06/14/18 09:27

Matrix: Solid

Date Received: 06/18/18 08:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.637		0.196	0.207		0.110	pCi/g	06/21/18 18:35	07/12/18 19:53	1
Actinium-227	-0.405	U	0.856	0.857		0.687	pCi/g	06/21/18 18:35	07/12/18 19:53	1
Bismuth-212	-0.0493	U	0.854	0.854		0.698	pCi/g	06/21/18 18:35	07/12/18 19:53	1
Bismuth-214	0.655		0.156	0.170		0.0430	pCi/g	06/21/18 18:35	07/12/18 19:53	1
Cesium-137	0.00662	U	0.0580	0.0580	0.0700	0.0466	pCi/g	06/21/18 18:35	07/12/18 19:53	1
Cobalt-60	-0.0202	U	0.0861	0.0861	0.200	0.0637	pCi/g	06/21/18 18:35	07/12/18 19:53	1
Lead-210	0.756	U	1.57	1.58		1.26	pCi/g	06/21/18 18:35	07/12/18 19:53	1
Lead-212	0.493		0.100	0.119		0.0451	pCi/g	06/21/18 18:35	07/12/18 19:53	1
Lead-214	0.600		0.127	0.142		0.0547	pCi/g	06/21/18 18:35	07/12/18 19:53	1
Potassium-40	10.8		1.69	2.02		0.292	pCi/g	06/21/18 18:35	07/12/18 19:53	1
Protactinium-231	0.483	U	3.02	3.02		2.47	pCi/g	06/21/18 18:35	07/12/18 19:53	1
Radium-226	0.655		0.156	0.170	0.700	0.0430	pCi/g	06/21/18 18:35	07/12/18 19:53	1
Radium-228	0.637		0.196	0.207		0.110	pCi/g	06/21/18 18:35	07/12/18 19:53	1
Thallium-208	0.218		0.0756	0.0789		0.0298	pCi/g	06/21/18 18:35	07/12/18 19:53	1
Thorium-228	0.493		0.100	0.119		0.0451	pCi/g	06/21/18 18:35	07/12/18 19:53	1
Thorium-232	0.637		0.196	0.207		0.110	pCi/g	06/21/18 18:35	07/12/18 19:53	1
Thorium-234	0.557	U	0.584	0.587		0.768	pCi/g	06/21/18 18:35	07/12/18 19:53	1
Uranium-235	0.0127	U	0.0530	0.0530		0.465	pCi/g	06/21/18 18:35	07/12/18 19:53	1
Uranium-238	0.557	U	0.584	0.587		0.768	pCi/g	06/21/18 18:35	07/12/18 19:53	1

Client Sample Results

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29039-2

Client Sample ID: PE2-RSYD10-U8-S017**Lab Sample ID: 160-29039-17**

Date Collected: 06/14/18 09:30

Matrix: Solid

Date Received: 06/18/18 08:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.600		0.255	0.262		0.0800	pCi/g	06/21/18 18:35	07/12/18 20:27	1
Actinium-227	-0.164	U	0.921	0.921		0.751	pCi/g	06/21/18 18:35	07/12/18 20:27	1
Bismuth-212	-0.0651	U	1.27	1.27		1.04	pCi/g	06/21/18 18:35	07/12/18 20:27	1
Bismuth-214	0.615		0.139	0.153		0.0184	pCi/g	06/21/18 18:35	07/12/18 20:27	1
Cesium-137	0.00674	U	0.0693	0.0693	0.0700	0.0558	pCi/g	06/21/18 18:35	07/12/18 20:27	1
Cobalt-60	0.0405		0.0499	0.0501	0.200	0.0296	pCi/g	06/21/18 18:35	07/12/18 20:27	1
Lead-210	0.239	U	1.74	1.74		1.42	pCi/g	06/21/18 18:35	07/12/18 20:27	1
Lead-212	0.610		0.121	0.144		0.0568	pCi/g	06/21/18 18:35	07/12/18 20:27	1
Lead-214	0.772		0.182	0.199		0.0691	pCi/g	06/21/18 18:35	07/12/18 20:27	1
Potassium-40	11.3		1.84	2.18		0.331	pCi/g	06/21/18 18:35	07/12/18 20:27	1
Protactinium-231	0.792	U	2.36	2.36		2.58	pCi/g	06/21/18 18:35	07/12/18 20:27	1
Radium-226	0.615		0.139	0.153	0.700	0.0184	pCi/g	06/21/18 18:35	07/12/18 20:27	1
Radium-228	0.600		0.255	0.262		0.0800	pCi/g	06/21/18 18:35	07/12/18 20:27	1
Thallium-208	0.216		0.0863	0.0892		0.0360	pCi/g	06/21/18 18:35	07/12/18 20:27	1
Thorium-228	0.610		0.121	0.144		0.0568	pCi/g	06/21/18 18:35	07/12/18 20:27	1
Thorium-232	0.600		0.255	0.262		0.0800	pCi/g	06/21/18 18:35	07/12/18 20:27	1
Thorium-234	-0.148	U	1.83	1.83		1.51	pCi/g	06/21/18 18:35	07/12/18 20:27	1
Uranium-235	0.268		0.224	0.225		0.135	pCi/g	06/21/18 18:35	07/12/18 20:27	1
Uranium-238	-0.148	U	1.83	1.83		1.51	pCi/g	06/21/18 18:35	07/12/18 20:27	1

Client Sample ID: PE2-RSYD10-U8-S018**Lab Sample ID: 160-29039-18**

Date Collected: 06/14/18 09:33

Matrix: Solid

Date Received: 06/18/18 08:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.491		0.150	0.158		0.0864	pCi/g	06/21/18 18:35	07/12/18 19:56	1
Actinium-227	0.258	U	0.576	0.577		0.385	pCi/g	06/21/18 18:35	07/12/18 19:56	1
Bismuth-212	-0.481	U	0.867	0.868		0.676	pCi/g	06/21/18 18:35	07/12/18 19:56	1
Bismuth-214	0.476		0.117	0.127		0.0356	pCi/g	06/21/18 18:35	07/12/18 19:56	1
Cesium-137	0.0229	U	0.0604	0.0605	0.0700	0.0476	pCi/g	06/21/18 18:35	07/12/18 19:56	1
Cobalt-60	0.0260	U	0.0372	0.0373	0.200	0.0269	pCi/g	06/21/18 18:35	07/12/18 19:56	1
Lead-210	1.09		1.19	1.19		0.815	pCi/g	06/21/18 18:35	07/12/18 19:56	1
Lead-212	0.424		0.0934	0.108		0.0469	pCi/g	06/21/18 18:35	07/12/18 19:56	1
Lead-214	0.477		0.116	0.126		0.0470	pCi/g	06/21/18 18:35	07/12/18 19:56	1
Potassium-40	10.5		1.48	1.83		0.293	pCi/g	06/21/18 18:35	07/12/18 19:56	1
Protactinium-231	0.000	U	0.799	0.799		1.92	pCi/g	06/21/18 18:35	07/12/18 19:56	1
Radium-226	0.476		0.117	0.127	0.700	0.0356	pCi/g	06/21/18 18:35	07/12/18 19:56	1
Radium-228	0.491		0.150	0.158		0.0864	pCi/g	06/21/18 18:35	07/12/18 19:56	1
Thallium-208	0.140		0.0602	0.0619		0.0253	pCi/g	06/21/18 18:35	07/12/18 19:56	1
Thorium-228	0.424		0.0934	0.108		0.0469	pCi/g	06/21/18 18:35	07/12/18 19:56	1
Thorium-232	0.491		0.150	0.158		0.0864	pCi/g	06/21/18 18:35	07/12/18 19:56	1
Thorium-234	-0.346	U	1.12	1.12		0.935	pCi/g	06/21/18 18:35	07/12/18 19:56	1
Uranium-235	0.187	U	0.319	0.320		0.275	pCi/g	06/21/18 18:35	07/12/18 19:56	1
Uranium-238	-0.346	U	1.12	1.12		0.935	pCi/g	06/21/18 18:35	07/12/18 19:56	1

QC Sample Results

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29039-2

Method: 905.0 - Total Beta Strontium (GFPC)

Lab Sample ID: MB 160-372348/9-A

Matrix: Solid

Analysis Batch: 374835

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 372348

Analyte	Result	MB MB MB	MB MB MB	Count	Total	DLC	Unit	Prepared	Analyzed	Dil Fac
				Uncert. (2σ+/-)	Uncert. (2σ+/-)					
Total Beta Strontium	0.06103			0.0592	0.0593	0.331	pCi/g	06/25/18 09:33	07/11/18 05:54	1
<i>Carrier</i>		%Yield	MB MB MB	Qualifier	Limits					
Sr Carrier	90.9				40 - 110			06/25/18 09:33	07/11/18 05:54	1

Lab Sample ID: LCS 160-372348/1-A

Matrix: Solid

Analysis Batch: 374835

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 372348

Analyte	Spike Added	LCS Result	LCS Qual	Count	Total	DLC	Unit	%Rec.	Limits
				Uncert. (2σ+/-)	Uncert. (2σ+/-)				
Total Beta Strontium	8.23	8.527		0.679	0.679	0.331	pCi/g	104	75 - 125
<i>Carrier</i>	%Yield	MB MB MB	Qualifier	Limits					
Sr Carrier	92.8			40 - 110					

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Lab Sample ID: MB 160-371769/1-A

Matrix: Solid

Analysis Batch: 375097

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 371769

Analyte	Result	MB MB MB	MB MB MB	Count	Total	DLC	Unit	Prepared	Analyzed	Dil Fac
				Uncert. (2σ+/-)	Uncert. (2σ+/-)					
Actinium 228	0.1189			0.0786	0.0795	0.118	pCi/g	06/21/18 18:35	07/12/18 17:30	1
Actinium-227	-0.1922	U		0.551	0.552	0.366	pCi/g	06/21/18 18:35	07/12/18 17:30	1
Bismuth-212	0.0000	U		0.421	0.421	0.576	pCi/g	06/21/18 18:35	07/12/18 17:30	1
Bismuth-214	0.04832	U		0.130	0.130	0.100	pCi/g	06/21/18 18:35	07/12/18 17:30	1
Cesium-137	-0.02891	U		0.105	0.105	0.0678	pCi/g	06/21/18 18:35	07/12/18 17:30	1
Cobalt-60	0.04344			0.0436	0.0438	0.0218	pCi/g	06/21/18 18:35	07/12/18 17:30	1
Lead-210	0.07464	U		1.24	1.24	0.907	pCi/g	06/21/18 18:35	07/12/18 17:30	1
Lead-212	-0.08648	U		0.0757	0.0765	0.115	pCi/g	06/21/18 18:35	07/12/18 17:30	1
Lead-214	0.0009339	U		0.102	0.102	0.0827	pCi/g	06/21/18 18:35	07/12/18 17:30	1
Potassium-40	0.0000	U		0.268	0.268	0.221	pCi/g	06/21/18 18:35	07/12/18 17:30	1
Protactinium-231	-0.5045	U		3.69	3.69	3.02	pCi/g	06/21/18 18:35	07/12/18 17:30	1
Radium-226	0.04832	U		0.130	0.130	0.100	pCi/g	06/21/18 18:35	07/12/18 17:30	1
Radium-228	0.1189			0.0786	0.0795	0.118	pCi/g	06/21/18 18:35	07/12/18 17:30	1
Thallium-208	-0.04121	U		0.186	0.186	0.0554	pCi/g	06/21/18 18:35	07/12/18 17:30	1
Thorium-228	-0.08648	U		0.0757	0.0765	0.115	pCi/g	06/21/18 18:35	07/12/18 17:30	1
Thorium-232	0.1189			0.0786	0.0795	0.118	pCi/g	06/21/18 18:35	07/12/18 17:30	1
Thorium-234	0.08379	U		0.784	0.784	0.630	pCi/g	06/21/18 18:35	07/12/18 17:30	1
Uranium-235	-0.01809	U		0.0755	0.0755	0.248	pCi/g	06/21/18 18:35	07/12/18 17:30	1
Uranium-238	0.08379	U		0.784	0.784	0.630	pCi/g	06/21/18 18:35	07/12/18 17:30	1

QC Sample Results

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29039-2

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: LCS 160-371769/2-A

Matrix: Solid

Analysis Batch: 375070

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 371769

Analyte	Spike Added	LCS		Uncert. (2σ+/-)	Total		%Rec.	Limits
		Result	Qual		LOQ	DLC		
Americium-241	96.8	95.81		10.0		0.487	pCi/g	99 87 - 116
Cesium-137	28.3	27.29		2.90	0.0700	0.0757	pCi/g	97 87 - 120
Cobalt-60	13.0	12.72		1.32	0.200	0.0242	pCi/g	98 87 - 115

Lab Sample ID: 160-29039-1 DU

Matrix: Solid

Analysis Batch: 375070

Client Sample ID: PE2-RSYD10-U8-S001

Prep Type: Total/NA

Prep Batch: 371769

Analyte	Sample Result	Sample Qual	DU Result	DU Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	RER	Limit
Actinium 228	0.672		0.6791		0.184		0.0573	pCi/g	0.02	1
Actinium-227	-0.297	U	0.2926	U	0.441		0.537	pCi/g	0.39	1
Bismuth-212	0.529	U	-0.5941	U	0.901		0.701	pCi/g	0.61	1
Bismuth-214	0.586		0.5561		0.153		0.0545	pCi/g	0.09	1
Cesium-137	-0.0353	U	-0.04468	U	0.0698	0.0700	0.0541	pCi/g	0.06	1
Cobalt-60	0.0423		-0.01006	U	0.0693	0.200	0.0338	pCi/g	0.37	1
Lead-210	1.05	U	-0.8110	U	1.79		1.44	pCi/g	0.52	1
Lead-212	0.614		0.5882		0.124		0.0443	pCi/g	0.1	1
Lead-214	0.659		0.5236		0.109		0.0491	pCi/g	0.52	1
Potassium-40	14.9		13.00		2.04		0.291	pCi/g	0.43	1
Protactinium-231	-0.393	U	0.4413	U	1.64		2.23	pCi/g	0.17	1
Radium-226	0.586		0.5561		0.153	0.700	0.0545	pCi/g	0.09	1
Radium-228	0.672		0.6791		0.184		0.0573	pCi/g	0.02	1
Thallium-208	0.314		0.2436		0.0714		0.0223	pCi/g	0.45	1
Thorium-228	0.614		0.5882		0.124		0.0443	pCi/g	0.1	1
Thorium-232	0.672		0.6791		0.184		0.0573	pCi/g	0.02	1
Thorium-234	0.435	U	-0.4824	U	1.49		1.21	pCi/g	0.43	1
Uranium-235	-0.0407	U	0.04182	U	0.250		0.447	pCi/g	0.25	1
Uranium-238	0.435	U	-0.4824	U	1.49		1.21	pCi/g	0.43	1

QC Association Summary

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29039-2

Rad**Leach Batch: 371225**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29039-1	PE2-RSYD10-U8-S001	Total/NA	Solid	Dry and Grind	
160-29039-2	PE2-RSYD10-U8-S002	Total/NA	Solid	Dry and Grind	
160-29039-3	PE2-RSYD10-U8-S003	Total/NA	Solid	Dry and Grind	
160-29039-4	PE2-RSYD10-U8-S004	Total/NA	Solid	Dry and Grind	
160-29039-5	PE2-RSYD10-U8-S005	Total/NA	Solid	Dry and Grind	
160-29039-6	PE2-RSYD10-U8-S006	Total/NA	Solid	Dry and Grind	
160-29039-7	PE2-RSYD10-U8-S007	Total/NA	Solid	Dry and Grind	
160-29039-8	PE2-RSYD10-U8-S008	Total/NA	Solid	Dry and Grind	
160-29039-9	PE2-RSYD10-U8-S009	Total/NA	Solid	Dry and Grind	
160-29039-10	PE2-RSYD10-U8-S010	Total/NA	Solid	Dry and Grind	
160-29039-11	PE2-RSYD10-U8-S011	Total/NA	Solid	Dry and Grind	
160-29039-12	PE2-RSYD10-U8-S012	Total/NA	Solid	Dry and Grind	
160-29039-13	PE2-RSYD10-U8-S013	Total/NA	Solid	Dry and Grind	
160-29039-14	PE2-RSYD10-U8-S014	Total/NA	Solid	Dry and Grind	
160-29039-15	PE2-RSYD10-U8-S015	Total/NA	Solid	Dry and Grind	
160-29039-16	PE2-RSYD10-U8-S016	Total/NA	Solid	Dry and Grind	
160-29039-17	PE2-RSYD10-U8-S017	Total/NA	Solid	Dry and Grind	
160-29039-18	PE2-RSYD10-U8-S018	Total/NA	Solid	Dry and Grind	
160-29039-1 DU	PE2-RSYD10-U8-S001	Total/NA	Solid	Dry and Grind	

Prep Batch: 371769

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29039-1	PE2-RSYD10-U8-S001	Total/NA	Solid	Fill_Geo-21	371225
160-29039-2	PE2-RSYD10-U8-S002	Total/NA	Solid	Fill_Geo-21	371225
160-29039-3	PE2-RSYD10-U8-S003	Total/NA	Solid	Fill_Geo-21	371225
160-29039-4	PE2-RSYD10-U8-S004	Total/NA	Solid	Fill_Geo-21	371225
160-29039-5	PE2-RSYD10-U8-S005	Total/NA	Solid	Fill_Geo-21	371225
160-29039-6	PE2-RSYD10-U8-S006	Total/NA	Solid	Fill_Geo-21	371225
160-29039-7	PE2-RSYD10-U8-S007	Total/NA	Solid	Fill_Geo-21	371225
160-29039-8	PE2-RSYD10-U8-S008	Total/NA	Solid	Fill_Geo-21	371225
160-29039-9	PE2-RSYD10-U8-S009	Total/NA	Solid	Fill_Geo-21	371225
160-29039-10	PE2-RSYD10-U8-S010	Total/NA	Solid	Fill_Geo-21	371225
160-29039-11	PE2-RSYD10-U8-S011	Total/NA	Solid	Fill_Geo-21	371225
160-29039-12	PE2-RSYD10-U8-S012	Total/NA	Solid	Fill_Geo-21	371225
160-29039-13	PE2-RSYD10-U8-S013	Total/NA	Solid	Fill_Geo-21	371225
160-29039-14	PE2-RSYD10-U8-S014	Total/NA	Solid	Fill_Geo-21	371225
160-29039-15	PE2-RSYD10-U8-S015	Total/NA	Solid	Fill_Geo-21	371225
160-29039-16	PE2-RSYD10-U8-S016	Total/NA	Solid	Fill_Geo-21	371225
160-29039-17	PE2-RSYD10-U8-S017	Total/NA	Solid	Fill_Geo-21	371225
160-29039-18	PE2-RSYD10-U8-S018	Total/NA	Solid	Fill_Geo-21	371225
MB 160-371769/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-371769/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	
160-29039-1 DU	PE2-RSYD10-U8-S001	Total/NA	Solid	Fill_Geo-21	371225

Prep Batch: 372348

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-29039-1	PE2-RSYD10-U8-S001	Total/NA	Solid	DPS-0	371225
160-29039-11	PE2-RSYD10-U8-S011	Total/NA	Solid	DPS-0	371225
MB 160-372348/9-A	Method Blank	Total/NA	Solid	DPS-0	
LCS 160-372348/1-A	Lab Control Sample	Total/NA	Solid	DPS-0	

Tracer/Carrier Summary

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-29039-2

Method: 905.0 - Total Beta Strontium (GFPC)**Matrix: Solid****Prep Type: Total/NA****Percent Yield (Acceptance Limits)**

Lab Sample ID	Client Sample ID	Sr Carrier (40-110)										
160-29039-1	PE2-RSYD10-U8-S001	88.6										
160-29039-11	PE2-RSYD10-U8-S011	90.7										
LCS 160-372348/1-A	Lab Control Sample	92.8										
MB 160-372348/9-A	Method Blank	90.9										

Tracer/Carrier Legend

Sr Carrier = Sr Carrier

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